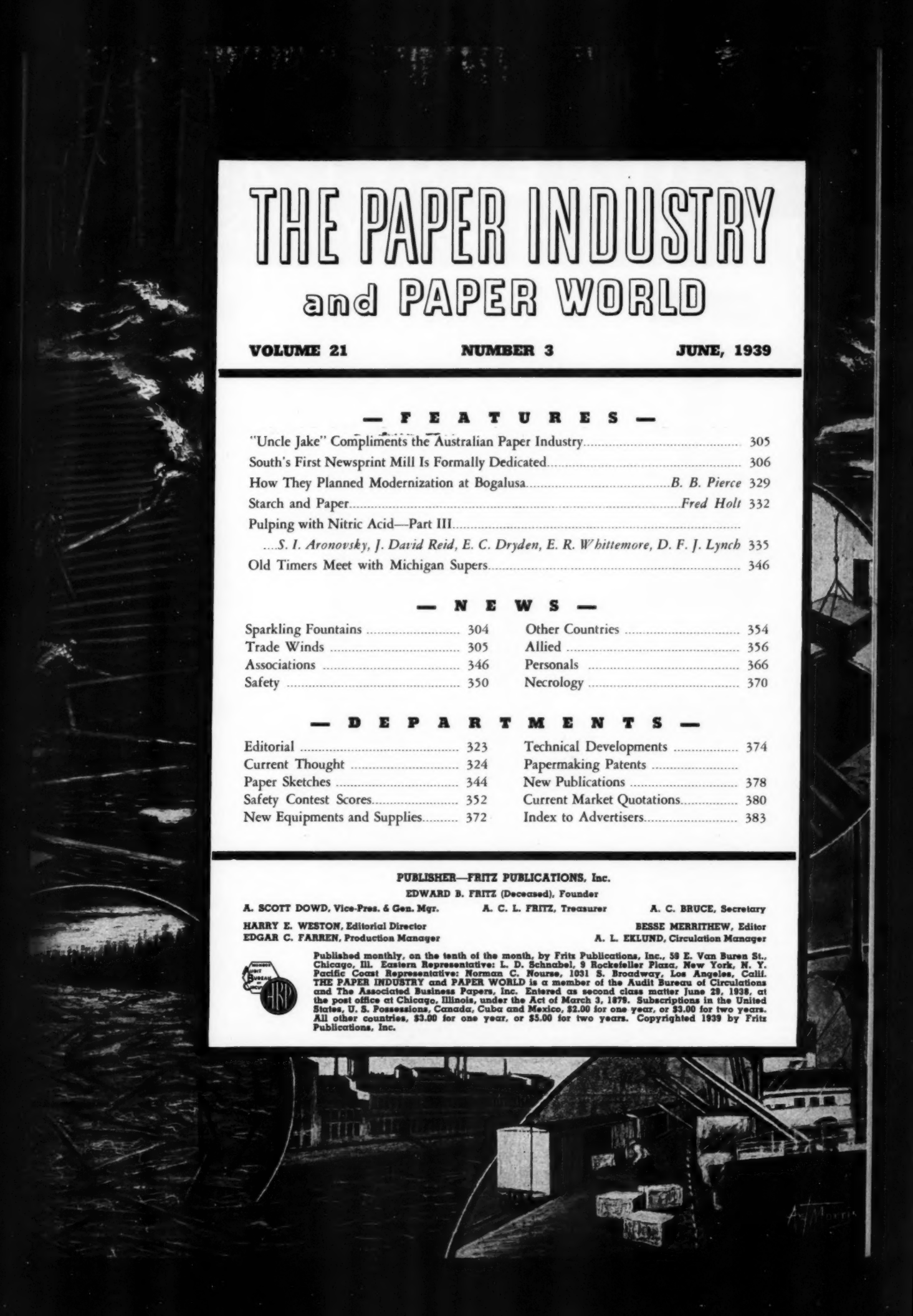

THE PAPER INDUSTRY and PAPER WORLD

VOLUME 21 **NUMBER 3** **JUNE, 1939**

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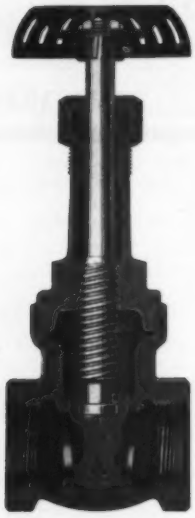

Fig. 2125
¼ to 3 in.
125 lb. S.P.
200 lb. W.O.G.

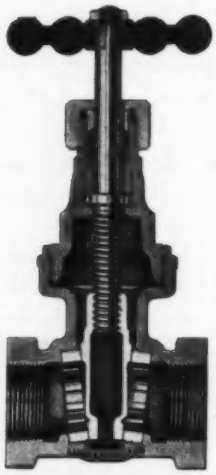

Fig. 768*
¼ to 3 in.
200 lb. S.P..
400 lb. W.O.G.

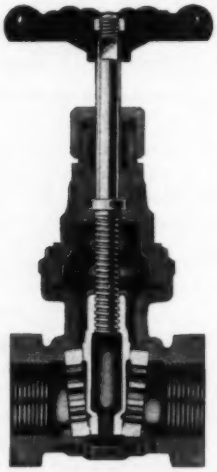

Fig. 771*
¼ to 3 in.
300 lb. S.P.
600 lb. W.O.G.

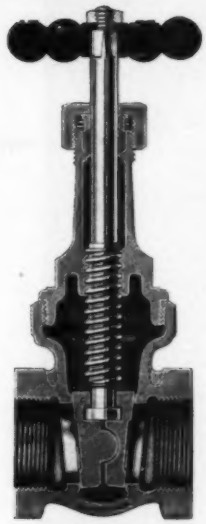

Fig. 427
¼ to 3 in.
150 lb. S.P.
300 lb. W.O.G.

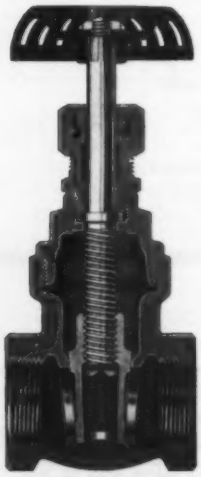

Fig. 2129
¼ to 3 in.
125 lb. S.P.
200 lb. W.O.G.

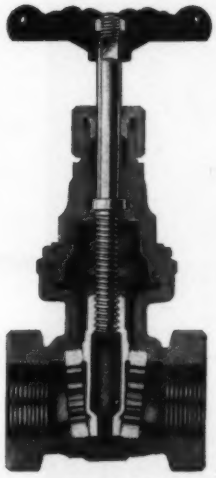

Fig. 1881*
¼ to 2 in.
350 lb. S.P.
1000 lb. W.O.G.

*Figs. 768, 771 and 1881 have renewable nickel alloy seat rings 1 in. and larger.

All patterns illustrated are also available with flanged ends.

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TRADE WINDS

"Uncle Jake" Compliments the Australian Paper Industry

▶▶▶ PARCHMENT, MICHIGAN, isn't a big town, but it is about the nicest small town one could find anywhere. Jacob Kindleberger, chairman of the board of the Kalamazoo Vegetable Parchment Company, is the man who made that town—the man who watched the company grow from what might have been considered the smallest of beginnings, into one of the most modern and progressive industrial plants in this country. Across the drive from the plant, the little town of Parchment blooms a welcome to more than 100 visitors each day. Here is proof that industrial communities do not need to be ugly settlements, because Parchment is a modern, beautiful little town.

Mr. Kindleberger is affectionately known to most of his acquaintances as "Uncle Jake." In February, he and Mrs. Kindleberger, accompanied by Mr. and Mrs. Greenlee, left the United States for a trip to Australia. Mr. Greenlee is vice president of the company, in charge of its Chicago office. They spent two months on that tour, and as soon as Mr. Kindleberger had disposed of the accumulation of work on his desk after returning home, the editor of this magazine went to Parchment to find out just what he thought of the paper industry in that far-away but highly progressive country, Australia.

▶▶▶ About the first thing Mr. Kindleberger said was that the trip was a revelation. It proved to him conclusively that the people in Australia and New Zealand are manufacturing conscious; they have found that they must begin to manufacture their own commodities. He was highly enthusiastic about the way they go about doing things over there. They have a special ability for organization.

The industry in this country has followed the development in Australia with a great deal of interest. It is only recently that pulp mills have been put into operation there, the paper mills

Jacob Kindleberger

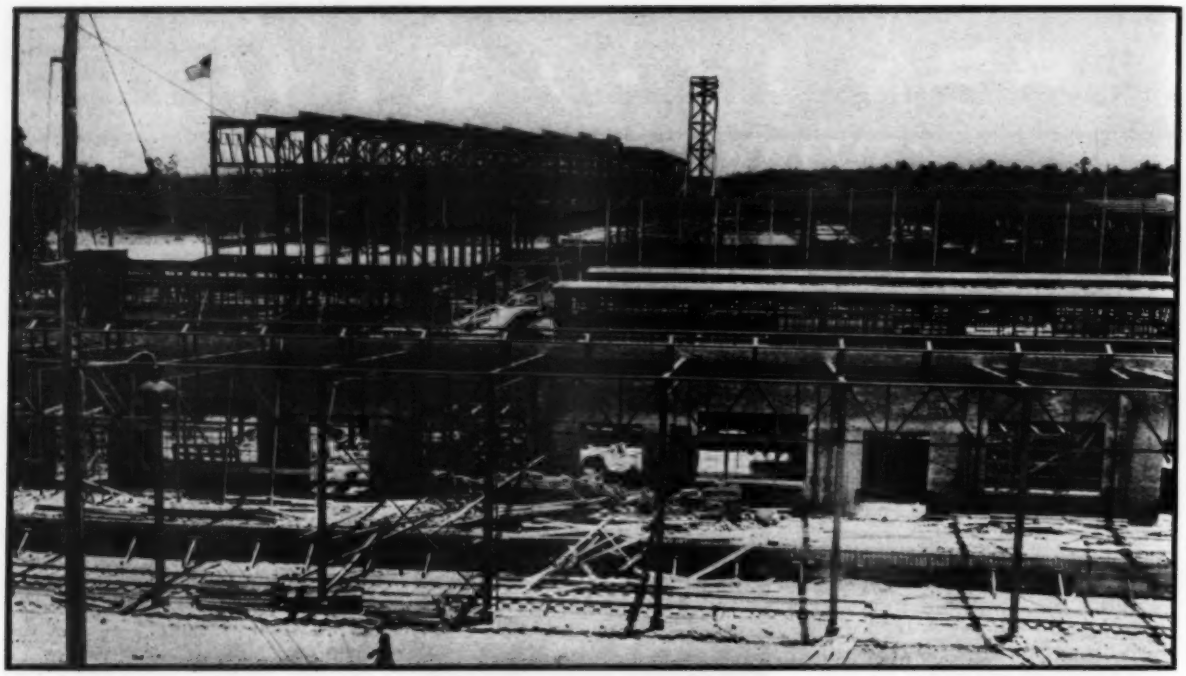
previously having to import their pulp because it seemed that pulpwood could not be procured in sufficient quantities in Australia.

Of course, the biggest thing they are doing in Australia now is manufacturing pulp from eucalyptus fiber. Eucalyptus grows abundantly over there and they are spending millions to build pulp mills to utilize this wood. The production of their own pulp will cause the industry to forge ahead beyond all expectations.

▶▶▶ Mr. Kindleberger exhibited a newspaper that had been printed on newsprint made from eucalyptus fiber. It is whiter than the newsprint used in this country, but it is not as strong. In Mr. Kindleberger's opinion, "it will never be as good as newsprint made from spruce pulp, since eucalyptus produces pulp with very short fibers." However, he thinks in time they may adopt processes that will overcome this imperfection. He firmly believes the pulp manufacturers over there are determined to keep up with the consumption. Australia is growing, and the paper manufacturers are not making the fatal mistake of sitting idly by letting their mills deteriorate, but they are constantly adding new equipment and expanding to keep up with the growing population.

▶▶▶ The thing that seemed to impress Mr. Kindleberger more than anything else was the care with which they choose their men. It seems the progress and expansion of the paper industry over there has lured men from every country, papermakers who have roamed the world over gleaning facts and figures and adopting practices that have been tried and found successful. He spoke most favorably of Sir Herbert Gepp, managing director of the Australian Paper Manufacturers, Ltd. To quote Mr. Kindleberger, "Sir Herbert Gepp is a man with an extraordinarily great faith, that is, he believes a thing can be done, and all new things put up to him go through the hands of his lieutenants to be sure each one is a good thing to do. Sir Herbert knows how to pick men. They are not neglecting the most important phase of any industry—the personnel. The American paper industry can learn some things about this aspect of the work from the Australian paper industry."

▶▶▶ News of developments as they are progressing in Australia are published regularly in the Other Countries section of this magazine. In that section of this issue will be found some late items submitted by the Australian correspondent of THE PAPER INDUSTRY AND PAPER WORLD.



A late construction view of the Lufkin plant.

South's First Newsprint Mill is Formally Dedicated

▶▶▶ THIRTEEN YEARS AGO two far-seeing scientists — Francis Patrick Garvan and Dr. Charles Holmes Herty —allied themselves, their ideas and their resources, to devote their entire lives to the development of the natural resources of the South. These two men, who felt the ignominy of the South's industrial position keenly—who were aware of the almost desparate economic and social situation and who were deeply sympathetic with the South's needs—were determined to infuse new blood into that area by the utilization of Southern pine for newsprint.

On May 27, 1939, the combined vision of these two men became one concrete reality, for on this date, Southland Paper Mills, Inc., Lufkin, Texas, was formally dedicated, and with it a beautiful commemorative plaque to Mr. Garvan and Dr. Herty, both of whom passed away before their efforts materialized.

▶▶▶ Over 300 visitors and guests from ten states and one foreign country participated in the dedication of the South's first newsprint mill. The rapidly growing structures that greeted the publishers and the stockholders of the company presented an imposing and significant sight and provided material evidence for speakers who declared it to be a turning point in the industrial life of East Texas.

George B. Dealey, president of the *Dallas News,* was the principal speaker. He paid tribute to the memory of the two scientists and praised the courage and the tenacity of E. L. Kurth, president of Southland, who completed the difficult task of developing the newsprint mill idea. Mr. Dealey was introduced by J. D. Ewing, publisher of the *Shreveport Times* and president of the Southern Newspaper Publishers Association. Although Mr. Dealey most generously praised others for their part in the development of this great project, it is known that he was one of its original promoters and his efforts were partially responsible for the mill being located in East Texas.

▶▶▶ At the termination of Mr. Dealey's address, a bronze plaque bearing the likenesses of Mr. Garvan and Dr. Herty was unveiled by the designer, Miss Allie Virginia Tennant, of Dallas, who received the plaudits of an appreciative audience. Sharing the applause with other notables was the family of Francis P. Garvan and Dr. C. H. Carpenter, of the Herty Foundation Laboratory at Savannah. The dedication ceremonies were held in the storage section of the main building.

Noted guests present for the occasion included Louis Calder, president of the Perkins-Goodwin Company; E. M. (Ted) Dealey of the *Dallas News;* E. K. Gaylord, a director of Southland; Hubert M. Harrison, manager of the East Texas Chamber of Commerce; W. H. McIntosh, president of the Texas Newspaper Publishers Association and N. Hermann of Helsingfors, Finland. E. L. Kurth was master of ceremonies.

In announcing the dedication of the first newsprint mill in the South, it is well perhaps, to present some of the earlier activities of the men who made such a mill possible, for the benefit of those who are not so well informed.

▶▶▶ Foremost among those who saw the possibilities of the South as an industrial section were, of course, Mr. Garvan and Dr. Herty. Mr. Garvan, late head of the Chemical Foundation,

Mrs. Garvan (left), widow of Francis P. Garvan, and Miss Allie Virginia Tennant, famous artist and sculptress of Dallas, pose together at dedication ceremonies held at the new plant of the Southland Paper Mills, Inc., Lufkin, Texas. The illustration at the right shows the plaque bearing likenesses of Mr. Garvan and Dr. Herty. The plaque was designed by Miss Tennant and unveiled by her.

was one of the first men in the country to realize the need for a self-contained American chemical industry. He became a leader in chemical thinking and eventually he became interested in Dr. Herty who was carrying on research in a little laboratory in Savannah. It was Mr. Garvan who provided the financial aid necessary to carry on the work which was eventually to result in the actual manufacture of newsprint from Southern pine. Dr. Herty allied himself with Mr. Garvan and the Chemical Foundation in 1926 in the capacity of an advisor. It was in 1926 that Dr. Herty announced his plans for the economic development of the South.

Dr. Herty's experiments proved more and more successful and eventually he announced the thorough adaptability of Southern pine for the manufacture of newsprint.

On June 1, 1938, at a meeting of the Southern Newspaper Publishers' Association, Texas publishers subscribed $270,000 toward the erection of the newsprint plant and a number of other Southern publishers also contracted to lend financial aid. Actual construction of the mill at Lufkin came after a long fight for the development of a native newsprint industry in the South. Texas publishers contracted to absorb the entire output of the mill for the ensuing five years. E. L. Kurth was elected president of the company, Arthur Temple was elected vice president, S. W. Henderson, Jr., was elected secretary, and Albert Newcombe was elected treasurer. Articles relative to Dr. Herty's experiments and the development of the Texas news mill have been reported from the initial stage onward in *Paper World* and THE PAPER INDUSTRY AND PAPER WORLD.

EXCERPTS FROM MR. DEALEY'S TALK

▶▶▶ Although THE PAPER INDUSTRY AND PAPER WORLD regrets that space does not permit printing Mr. Dealey's address at Southland's dedication in its entirety, it is pleased to present herewith some interesting excerpts from his talk.

▶▶▶ "It is an occasion worthy to be solemnized. We stand here in a reverential spirit. Our gathering together marks the end of a long trail of disappointments and discouragements, of labor and travail. But we do not . . . or should not . . . regret those years when all efforts to send these walls upward seemed destined to fail. The very darkness of the past makes brighter the joy of fulfillment. . . ."

▶▶▶ "Had it not been for Francis

Left—E. L. Kurth, president of Southland Paper Mills, Inc., is shown as he presided over ceremonies held recently in the skeletonized framework of the plant. Right—The principal address at the dedication ceremonies was given by G. B. Dealey, veteran Texas newspaperman and president of the Dallas News.

Patrick Garvan and his timely aid, the pioneer research in the field of making newsprint and other paper from the common varieties of Southern pine being carried on by Dr. Herty must perforce have failed through lack of financial resources. Without Francis Patrick Garvan's financial aid, it is doubtful if there would be a Herty Foundation today. . . ."

▶▶▶ "As for the late Dr. Charles Holmes Herty, most modest of men, whom we all knew and loved . . , he was closer to us than Garvan because he lived and moved among us for so many years . . . a tireless devotion to many worthy causes marked the entire period of his long and useful life. No man had greater faith in the ultimate destiny of the South than Charles Holmes Herty. . . ."

▶▶▶ "His (Herty's) work as research chemist in charge of the Savannah Pulp and Paper Laboratory brought that modest plant to the forefront as the agency which had the privilege of showing the world that the pulp of the pine trees will produce successfully not only newsprint but other grades of paper. . . ."

▶▶▶ "We honor these two great men today. We honor ourselves by knowing them. We honor at the same time Mr. E. L. Kurth and his associates for the glorious and vital part they have had in bringing this great project into being. It is the dawn of a new day not only for East Texas, but all of Texas. From this lone mill, a new industry will grow and expand until it covers the entire Southland. . . ."

◆

THE STORY OF NEWSPRINT

The International Paper Company recently issued one of the most elaborate and graphic compilations of a story in pictures that has ever been published. This book of 78 pages and cover is entitled "Newsprint." In view of the large number of illustrations and their continuity, this volume might be termed a scenario, the play outlined being the story of how paper for some of the world's great newspapers is made. The book is 10½ inches by 13¾ inches.

No expense or effort was spared to make this collection of photographs one of the finest and most complete ever assembled on this subject. Most of the photographs were taken by that ace camerawoman, Margaret Bourke-White. Some also were made by H. F. Kells, Edward J. Herbert, Dominion Forest Service, and Associated Screen News. The aerial views are beyond description, they are so impressive. Through the forest, over the log booms, through every operation of manufacture with view after view of paper machines, mill views and finished product, the cameras have recorded just how it is done. They even have followed the employees as they left the plant—close-ups that are real pictures of some of the men who make paper. Some of the photographs are enlarged to full page size and they are reproduced by offset on a fine sheet of book paper. This method lends exceptionally fine depth and tone to the pictures, especially those taken in the out-of-doors.

The book has a stiff linen cover, Cellophane jacket and all. It is really a fitting tribute to one of the greatest divisions of the paper industry.

An inspection tour of the Institute of Paper Chemistry was one of the features of the fourth annual executives' conference held in Appleton, Wisconsin, May 18 and 19. John Younger, of the Institute staff, is shown in the humidity room making a multiple fold test. Left to right —Kenneth Huse, general superintendent of the Eastman Kodak Company; Paul V. Lacey, Covington, Va., West Virginia Pulp and Paper Company; S. B. Jones, Piedmont, West Virginia, also of the West Virginia Company; Dr. Harry F. Lewis, dean of the Institute; and Younger.

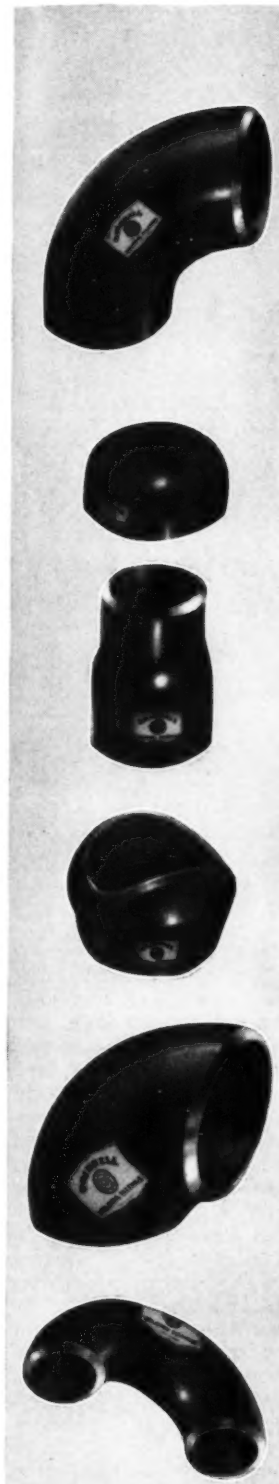
◆

BROWN COMPANY REORGANIZATION AWAITS AGREEMENT

The Brown Company reorganization hinges on an agreement between security holders and their willingness to meet the conditions laid down by the Reconstruction Finance Corporation. Edwin M. Chandler, a Maine Central Railroad executive chosen to bring about agreement, is a veteran of many industrial compromises and arbitrations.

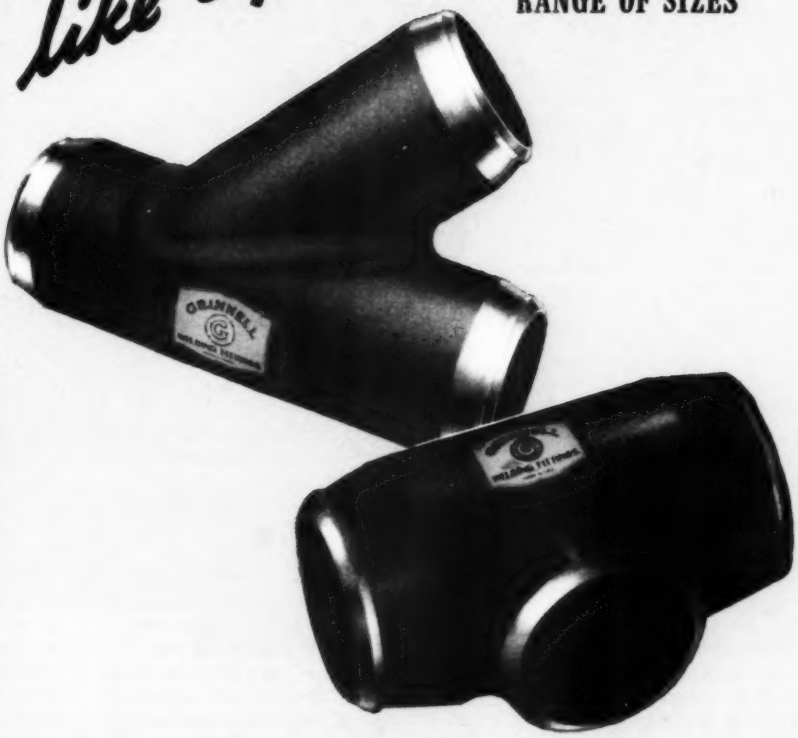
The bondholders object to accepting the absolute junior position which acceptance of the RFC's conditions imply. The RFC requires that it take first mortgage on all assets for its $9,000,000 loan. (cf. THE PAPER INDUSTRY AND PAPER WORLD p. 126, May, 1939) and that this priority continue during the life of the advance. Interest on this loan, plus repayments and an adequate working capital must be built up before any payments can be made to bondholders. The certificate exchanged will be along these lines: for each $1,000 first mortgage, a $600 general mortgage plus a $600 debenture convertible into 60 shares of new common together with two shares of common and a small amount of cash. Preferred stockholders would get 1.2 shares of new at 5 per cent against the old 7 per cent plus 2 shares of new common and the $50 cumulative interest. Common stock control under the plan would rest largely in the Brown family as before.

Equipment companies are waiting impatiently for the plan to go through as it is believed that the Brown Company will undertake some important repair and modernization work very soon afterwards.



They're made like "Specialties"

... BUT THEY'RE STOCK ITEMS IN A WIDE RANGE OF SIZES



IF you requested a Welding Tee or Lateral made-to-order, you couldn't get one more carefully designed and constructed, or better finished, than the Grinnell Welding Fittings shown above. Yet they're stock items, regularly available in a wide range of sizes from Grinnell!

Grinnell Welding Fittings weld easily, make smooth, strong joints. Their pressure-temperature ratings are identical with seamless pipe. Outlets are extruded, so that all welds may be simple circumferential butt welds.

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WHENEVER PIPING IS INVOLVED

CHICAGO PLANT TAKEN OVER BY NEW COMPANY

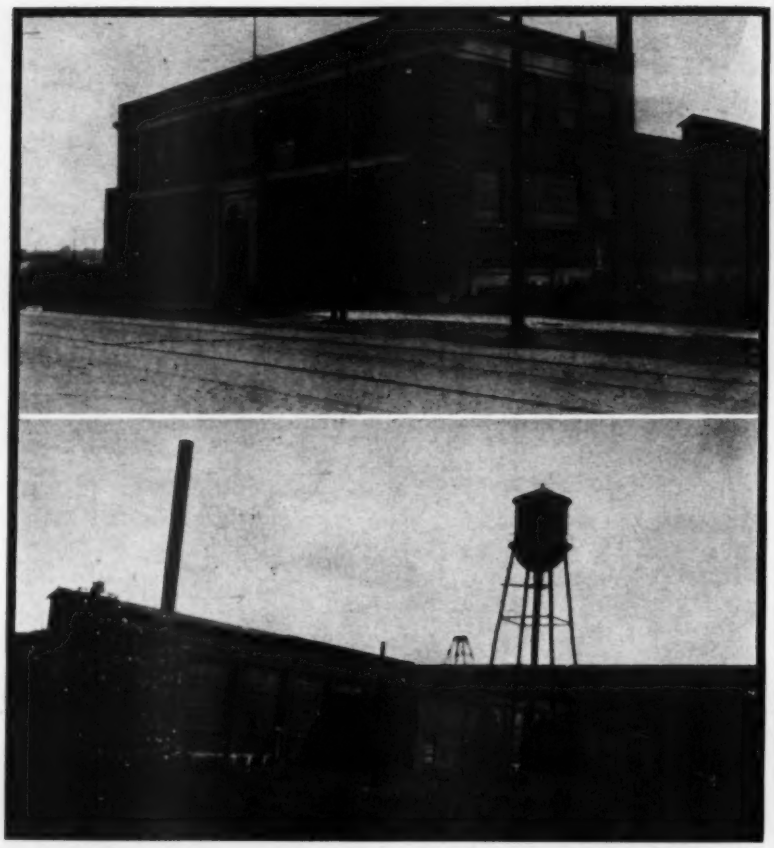
News of special interest to the industry was the announcement on June 2 that a new corporation known as the Waterway Board and Paper Company had purchased from the International Paper Company the Chicago plant known as the Waterway Paper Products Company, which had been closed since 1933.

The officials of the new company, some of whom were connected with the original Waterway Board and Paper Company, are: Chairman of the board, Alfred B. Geiger, president of Hall Printing Company, Chicago; president, Emanuel M. Mendelson; secretary-treasurer, D. H. Mendelson.

Attorneys for the International Paper Company, negotiating the transaction, have announced that the new corporation will manufacture box board, cartons, boxes and paper specialties. When the original plant was built in 1921, it was equipped to manufacture newsprint, and the product was taken over for a time by the *Chicago Daily News*. Much of the original equipment has been removed from the plant, and it is understood that the mill will be equipped with new machinery. It is estimated the investment, which will include purchase of the plant and new equipment, will run around $3,500,000. When the new plant is equipped and put in operation, it is expected it will employ approximately 500 persons.

The buildings of the Waterway plant are in fine condition, and as the location and facilities are exceptionally good, the new company should find the operation of the plant, when completed, very economical and advantageous.

◆



This magazine's cameraman climbed a high fence to take some pictures of the plant of the Waterway Paper Products Company. Above—The office building which faces Kedzie Avenue, Chicago. Below—Part of the plant which extends from the office back to the next street.

EASTERN CO. PLAN IN FINAL STAGES

The reorganization proceedings of the Eastern Manufacturing Company are not complete as yet, although only a few finishing touches remain to place the Eastern Corporation, as it is to be known, completely under its own management again. First action along this line was the election of nine directors by the five trustees. The new directors are: Edward M. Graham, president of the company; Edward A. Macquade of New York, George F. Eaton of Bangor, Franklin E. Braff of Bangor, William H. Cummings of Skowhegan, Maine, Frank A. Farrington of Augusta, Maine, Charles L. Hildreth of Portland, Maine, Harold C. Keith of Brockton, Massachusetts, and Robert L. Moore of Boston.

In completing its plans for final reorganization, Eastern has written off $3,124,000 of doubtful assets, including one charge-off of $1,106,000 for elimination of write-ups on timberlands. The Company emerges from 77-B in an unusually strong position with cash holdings of more than $1,000,000. The company has earned a net income even on its old expanded capitalization in 1937 and 1938 and so far this year.

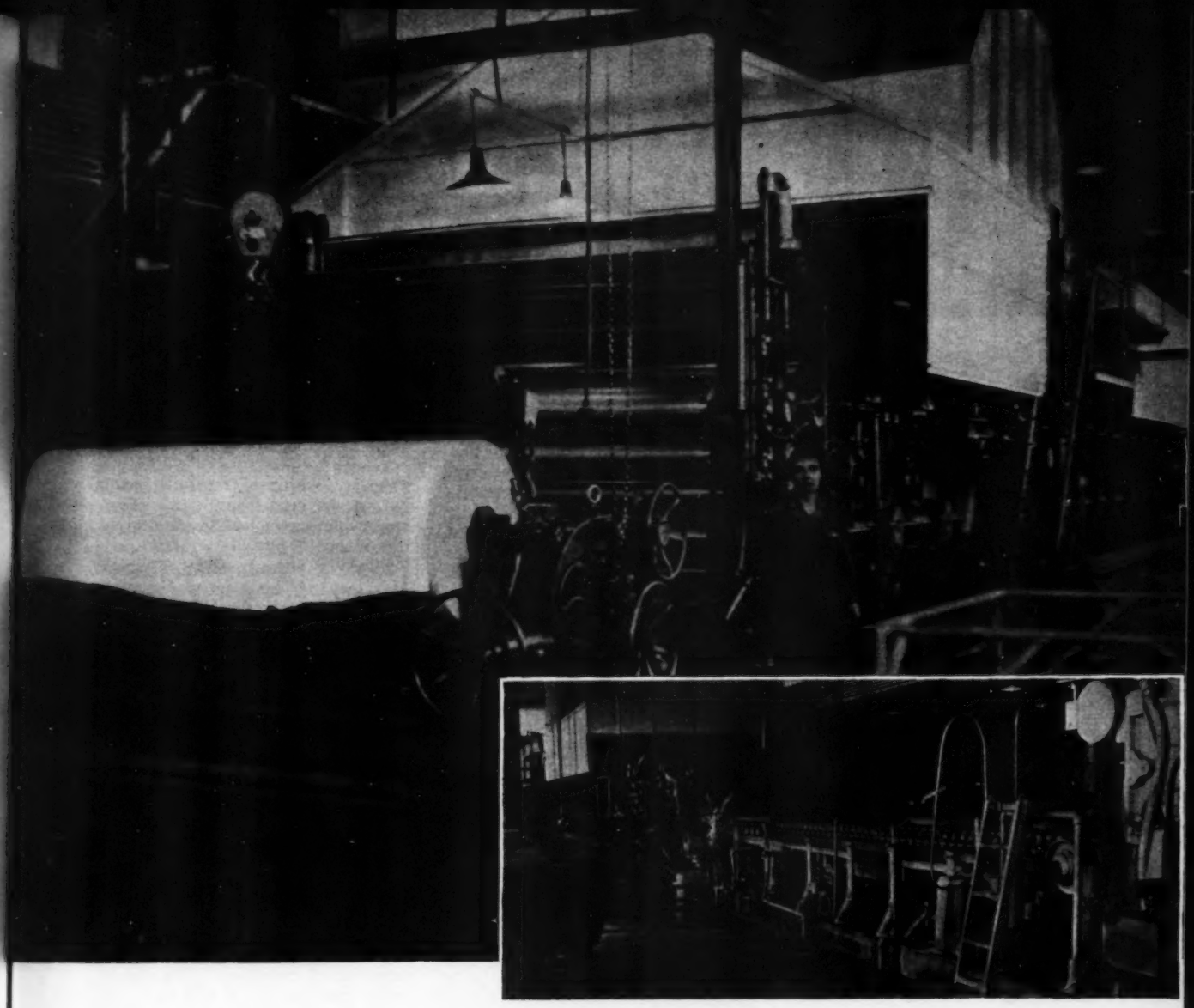
◆

CELOTEX BUYS PLANT . . ADDS GYPSUM LINE

The Celotex Corporation, in a move which now brings it one step closer to rounding out its present diversified line of products, has added a complete new line of gypsum products through the purchase of the properties, plant, good-will and manufacturing facilities of the American Gypsum Company, Port Clinton, Ohio.

The purchase adds a complete line of gypsum wallboards, liner boards, gypsum lath and gypsum block, base and finish coat gypsum plasters, specialty plasters, acoustical plaster, land plaster, lime, building products and accessories. The well-known line bearing the Anchor, Indian Head and White Rock trade-marks will be continued under their present names and markings and will be identified with the Celotex Corporation by adding the Celotex trade-mark to all existing packages. The same merchandising policies which have been used for Celotex Products will be extended to the marketing of the new line of products.

The American Gypsum Division of the Celotex Corporation comprises a well-equipped, up-to-date plant at Port Clinton, Ohio. The property includes a supply of high-grade gypsum rock which, it is estimated, is sufficient to supply the needs of the plant for more than a century from three rich veins which have already been opened. C. F. Miller, formerly president of the American Gypsum Company, will remain with the Celotex Corporation as general manager of the Port Clinton operations.



Latest Combination Yankee Machine

This Combination Yankee Machine was installed late in 1938 for Southern Advance Bag and Paper Company, Inc., Hodge, Louisiana. As makers of Yankee dryer cylinders for over fifty years, we are proud to present this example of "Puseyjones" craftsmanship, representing the last word for the manufacture of high grade M. F. and M. G. kraft specialties.

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...So we used NAYLOR Lockseam Spiralweld PIPE"

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FACSIMILE BROADCASTING WILL INCREASE USE OF PAPER

▶▶▶ RADIO'S LATEST MIRACLE, facsimile broadcasting, first announced in this magazine in the April, 1939 issue, is already being counted as one of the latest scientific developments. Already this marvelous method of news reproduction is being publicized widely, and the public is becoming facsimile conscious. It has swept the nation in a shorter length of time than any other new development of its kind. A number of broadcasting stations sponsored by newspapers have been experimenting with this phenomenal form of transmission, and recently Station WGN, owned and operated by the *Chicago Daily Tribune*, has been broadcasting an experimental program during the early morning hours (1:35 to 2:00 a.m.).

The paper industry, of course, has been watching this development with special interest for the reason that when it was first announced some question was raised as to what it would do to the consumption of newsprint should it come into general use. THE PAPER INDUSTRY AND PAPER WORLD has followed up all phases of this subject endeavoring to find an answer to this query. After going into the matter extensively, and talking with officials of the two large manufacturers now marketing this equipment, it has been learned that the questions "What kind of paper will you use?" and "How much paper will be consumed?" have not been given much consideration.

▶▶▶ As stated in the former article on this subject (April, 1939), the R. C. A. machine uses an exceptionally fine quality of carbon paper in its receiving set. The newspaper run through this machine is now being printed on book paper. It seems little thought has been given to that part of the equipment as yet, since the amount of paper being consumed has not been sufficiently large to be counted a cost item. However, it is definitely stated by R. C. A. officials and technicians that later on, when receiving sets are being bought in quantities and broadcasting has been definitely accepted in enough homes, paper will have to be given more consideration. It is believed that a good grade of newsprint will be used ultimately on the R. C. A. machine.

This machine is now broadcasting copy on a sheet 8½ inches wide. Receiving sets use paper at the rate of about 3 linear feet per hour, or 100-110 words per minute. Each receiver calls for 345 ft. of white paper, 95 ft. of carbon paper. Stations now broadcast about 6-9 feet per day, which means that each receiving set in operation would use up that amount of paper.

The Crosley *Reado* uses a specially processed paper which is an exclusive Crosley development. Rolls of this paper for use with the *Reado* are available from all Crosley dealers and cost $1.00 each.

▶▶▶ The subject of facsimile broadcasting was given considerable prominence during the spring meeting of the Inland Daily Press Association, held at the Sherman Hotel, Chicago, May 16-17. This association's membership is composed of leading newspapers throughout the midwestern states. Many phases of the subject were brought up and the association listened to a very informative address by H. C. Vance, of the R. C. A. Manufacturing Company, Camden, New Jersey. That company was demonstrating its broadcasting and receiving equipment in a room adjoining the assembly room where the meetings were held. After all talks on the subject had been given and questions answered, and after the demonstration of the equipment had been exhibited and explained, one was left with the very definite conclusion that facsimile broadcasting need not affect the consumption of newsprint. The opinion rather prevails that it will be a new child in the publishing family, therefore, will become an adjunct to newspapers now being published. Of course, the children of science grow up, and, like those of the human race, no one ever can be quite sure how they will develop. But in our everyday lives, we now count as necessities many things that once were born in a world that gave them not even a fighting chance to keep alive.

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WASHINGTON

FTC and Newsprint

As a result of investigations made by both the Federal Trade Commission and the Department of Justice on various complaints that certain activities of manufacturers and distributors of newsprint violated the anti-trust laws, Attorney General Frank Murphy issued a statement on May 24, directing the members of the Department of Justice to undertake two different types of action. On the latter date, subpoenas

were issued requiring the attendance of witnesses at an inquiry before a federal grand jury in the Northern District of California at San Francisco. This proceeding is limited to activities of newsprint producers and distributors in the Pacific coast area. In addition, agents of the Department of Justice are making a general investigation of newsprint trade practices in other parts of the United States.

According to the Department of Justice statement, some evidence secured by the Federal Trade Commission indicates that concerted action by Canadian manufacturers restrains freedom of competition in the United States newsprint market. Other evidence tends to show that certain United States manufacturers and distributors co-operate with Canadian producers to maintain prices in this country. United States producers and distributors in the Pacific coast area are largely independent of the rest of the industry. Evidence secured by the FTC indicates that they have established restraints upon competition by concerted action in violation of the Sherman Act. Consequently, the Department of Justice is required to present this evidence to a federal grand jury.

Wage and Hour

A decision of great importance to the pulp and paper industry has been made by the Wage and Hour Division of the Department of Labor. The paper industry had asked for an exemption from the maximum hours provision of the Fair Labor Standards Act for seasonal occupation in the woods. It was decided that the sap peeling of pulpwood can only be performed in certain seasons and includes felling, trimming and peeling of pulpwood trees and that hauling on ice and snow roads is a winter and, therefore, seasonable occupation.

Exemption was therefore granted for sap peeling operations whenever and wherever conducted; for ice and snow hauling in Maine, Massachusetts, New Hampshire, Pennsylvania, Vermont, Michigan, Minnesota, Wisconsin and New York, and for spring freshet driving in Maine, New Hampshire, New York, and Vermont. To the pulpwood industry, the most important provision is that the sap peeling exemption includes felling, trimming and peeling of trees, in addition to bucking and piling if performed in the sap peeling season.

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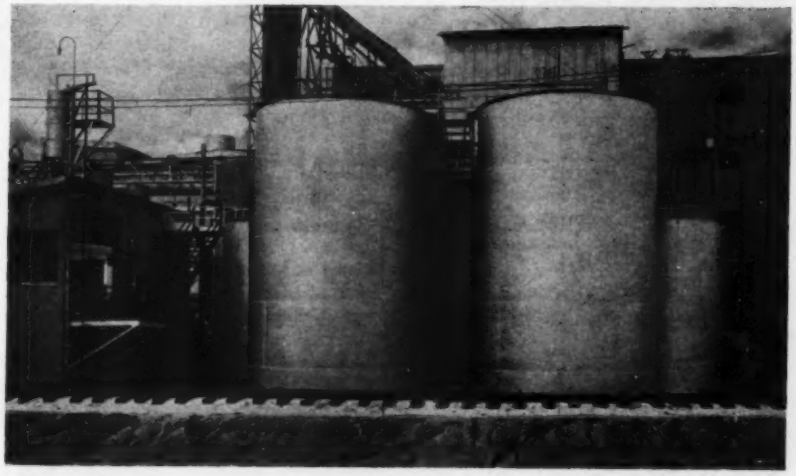
▸▸▸ THE NORTHERN PAPER COMPANY, Ltd., Vancouver, B. C., has made formal application to change the company name to the Maritime Paper Company, Ltd.

TANKS for HANDLING the WATER REQUIREMENTS of PAPER MILLS

Right: View of a 10 ft. diam. by 15 ft. service tank and 10 ft. by 40 ft. surge tank at the water pumping station of the West Virginia Pulp and Paper Co. kraft mill near Charleston, S. C. Shown below is a group of tanks that are used to filter boiler feed water at this mill.



Left: 10 ft. diam. by 30 ft. pressure screen tanks in the water line between the reservoir and the plant. They remove suspended material from the supply.

ILLUSTRATED here are three examples of some of the types of steel tanks used in paper mill water systems. They are of modern welded construction, designed to meet the requirements of this particular installation. Long experience in working with paper mill people has made us appreciative of the special problems and requirements of the industry. We specialize in the building of elevated water tanks, flat-bottom storage tanks and stress-relieved pressure vessels. Quotations given gladly on any work you may be contemplating. Please address our nearest office for information or quotations.

CHICAGO BRIDGE & IRON COMPANY

Cleveland.....2267 Rockefeller Bldg.
Birmingham.....1511 North Fiftieth Street
Tulsa.....1651 Hunt Bldg.
Houston.....2919 Main Street
Detroit.....1566 Lafayette Bldg.
Philadelphia.....1653-1700 Walnut Street Bldg.
Boston.....1562 Consolidated Gas Bldg.
Los Angeles.....1459 Wm. Fox Bldg.
Chicago.....2445 Old Colony Bldg.
New York.....3350-165 Broadway Bldg.
Dallas.....1446 Liberty Bank Bldg.
San Francisco.....1017 Rialto Bldg.

Plants at Birmingham, Chicago and Greenville, Pa.

NEW ENGLAND PULP NEWS

THE pulp market in the New England section has not been in any too happy condition this past month. Abroad, several leading shippers are seeking business but are still quoting $50 dock for bleached sulphite. A Canadian mill, that was scheduled to go into production recently, was hawking some 400 or 500 tons of bleached sulphite around $45 dock equivalent. The rumored $25 dock, kraft, is a rumor and nothing more. Categorical denials come from several shippers to whom the price was attributed. The better Scandinavian krafts are still a firm $28-$30 dock and no good Southern United States kraft has been offered under $28 dock northern ports. Of course, there are pulps which some board makers might use that have been available as low as $26 dock.

At Boston the B. and M. Railroad is still embargoing all pulp cargoes unless every pound of pulp discharged is loaded out within free time. This condition has been true most of the year due to large tonnage standing in cars. This tonnage belongs to mills who won't take delivery.

In Boston newspapers recently three appeared several large, unsigned advertisements asking the public to write Congressmen and Senators requesting action against alleged dumping of German pulp.

16-INCH ROLLS OF NEWSPRINT ARE DUTY FREE

All newsprint in rolls sixteen inches or more wide may be imported free of duty, the treasury advised publishers on May 31. The commonly used widths of newsprint were on the free list, but to eliminate red tape over the occasional importation of certain widths, the treasury changed its regulations to define "standard newsprint" as any sixteen or more inches wide.

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FINANCIAL

THE manner in which conditions in the paper industry have changed in 1939 as compared with 1938 is shown by earnings reports for the first quarter of 1939, compared with those for the same period in 1938, items marked with an asterisk being losses.

Company	Earnings First Quarter, 1939	Earnings First Quarter, 1938
Minnesota & Ontario	$659,748*	$712,714*
Container Corp.	24,199	53,198*
Hinde & Dauch	152,575	194,904
Mead Corp.	77,110	152,939
Nat. Container	50,735	51,076
Union Bag	153,490	354,250
Scott Paper	446,592	459,653
Soundview (4 Months)	80,669	246,724
International	12,428	124,939*
Am. Writing	26,321	22,245*
Paraffine	336,398	117,459
Certain-teed	148,659*	189,588*
Cont. Diamond	17,309	238,754*
Robert Gair	35,785*	14,045
Sutherland Paper	115,652	194,905
Ruberoid	94,427*	193,758*
MacAndrews & Forbes	186,065	157,021
Kimberly-Clark	598,660	575,000
Oswego Falls	106,035	109,808
Oxford	111,615	19,324
Nashua Gummed	34,031	24,081*

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New York Stock Exchange—Stocks

	Closing Prices May 31	April 29
A. P. W. Paper	*1⅜–2	——
Celotex	12⅞	11½
Same Preferred	*66–69	68
Certain-teed Products	8¼	7⅞
Same Preferred	29	27½
Champion P. & F. Co.	20⅞	20½
Same Preferred	98½	100
Container Corp.	11⅜	10⅛
Cont. Diamond	7½	6
Crown Zellerbach	10½	10⅜
Same Preferred	*77–79	——
Dixie Vortex	*10¼–10½	11½
Same "A"	*33–34	32½
Flintkote	21½	18¾
Robert Gair	*2¾–2⅞	2½
Same Preferred	*8¾–10	9
Gaylord Container	*14¾–15¼	——
Same Preferred	*46–48½	——
International P. & P.	8¾	8
Same Preferred	32¼	29¼
Kimberly-Clark	*26–27⅛	——
MacAndrews & Forbes	29	28
Masonite	41½	39½
Mead Corp.	8¾	8⅛
Same Preferred	*58–61	60
Paraffine Co.	45½	41¾
Rayonier	9¼	8⅞
Same Preferred	15½	16
Scott Paper	*49⅜–50½	46
Same Preferred	*115–117	114⅜
Sutherland Paper	*26–27¾	25¼
Union Bag & Paper	8¾	8⅜
U. S. Gypsum	88	81
Same Preferred	*175⅛–177	167

New York Stock Exchange—Bonds

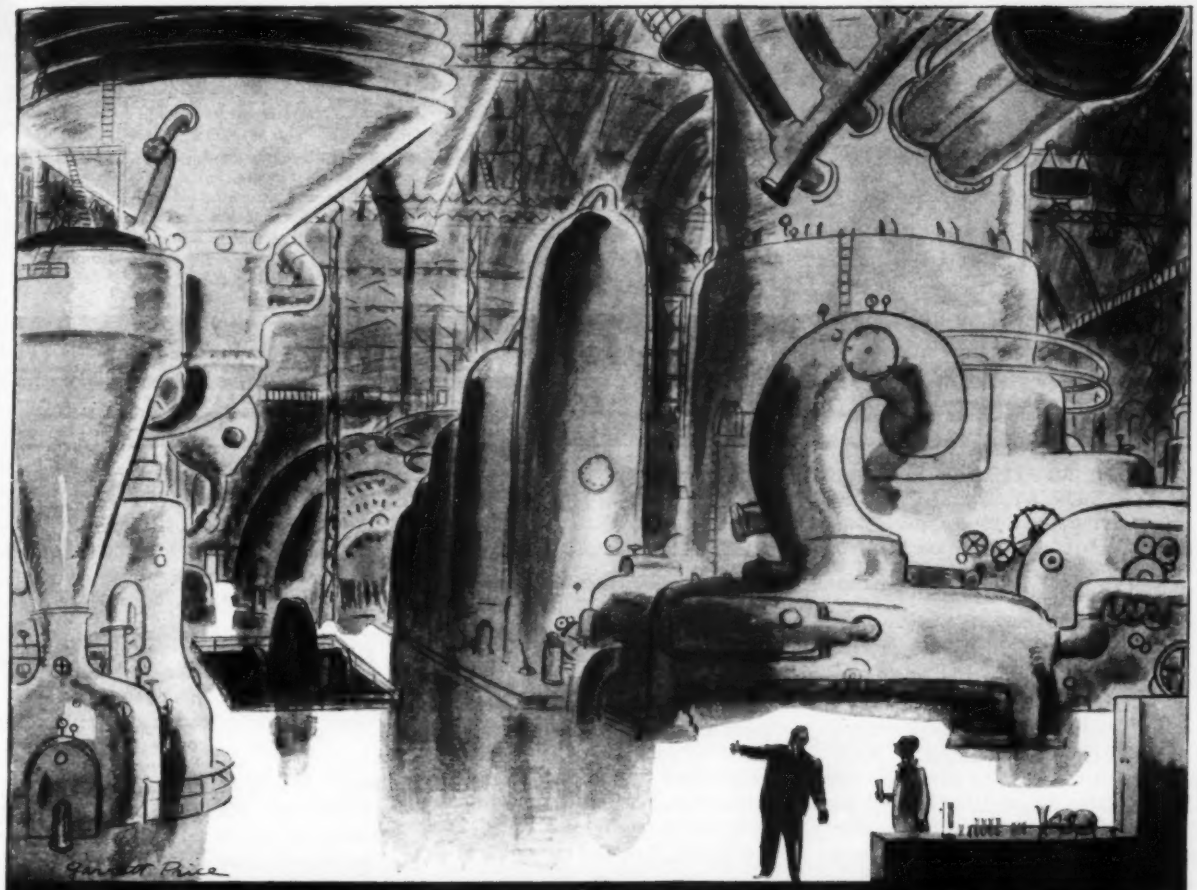
Celotex 4½%	86¼	82
Certain-teed 5½%	74¼	73
Champion P. & F.	103⅜	100½
Container Corp. 5%	99	96½
Inter. P. & P. Co. 6%	.....	85¼
Same 5%	98⅛	94¼
Mead Corp.	.....	104

New York Curb Exchange—Stocks

Am. Boxboard	7	6
Brown Co. Preferred	14⅜	14½
Det. Paper Products	*1¼–1½	1¾
Great Northern	*35¾–36½	33
Hummel-Ross	3	3¼
Nat. Container	*6¾–7⅛	5¾
St. Regis	2⅛	2⅛
Taggart	*3¼–3½	3¾
United Wall Paper	2	1¾

*Closing Bid and Asked.

These executives of "Life" and "Fortune" magazines recently visited the Wisconsin Rapids division of the Consolidated Water Power and Paper Company, where the "Fortune" officials were introduced to Consolidated's paper coating process, by which the paper used in "Life" is made. They are shown here not shooting pictures but clay pigeons. Left to right—Kent Rhodes, production manager of "Fortune;" Frank Doerr, technician and chemist with "Life;" Nick Wallace, assistant vice president of "Time, Inc.;" Louis Gratz, business manager of "Fortune;" and Earl M. McCourt, of the Consolidated Company.



SO NOW YOU NEED ALUMINUM FLUXO-KLYPTATE!

● New developments in many industries are requiring chemical products that, in some cases, are strangers to the circle of accepted industrial chemicals . . . for use in processing, as catalysts, or as component parts of finished products.

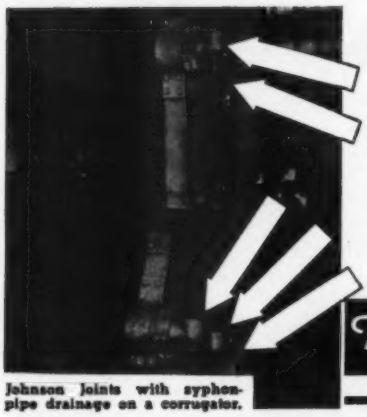
General Chemical Company, as a manufacturer of a wide range of chemicals, is singularly well fitted to develop "tailor made" chemicals for these specialized circumstances. Its Baker and Adamson Laboratory Chemical Division and its Industrial Chemical Division give you the combined benefits of experienced men and the special equipment necessary for commercial production of unusual chemical combinations.

When your new process or your new product reaches the state of development where it requires chemicals not commercially available, let our chemists and engineers work with you. They will help you move your product from the laboratory to the production line. Your inquiries on this kind of service are cordially invited and they will be regarded as strictly confidential.

GENERAL CHEMICAL COMPANY

Executive Offices: 40 RECTOR STREET, NEW YORK, N. Y.

Sales Offices: Atlanta • Baltimore • Boston • Buffalo • Camden (N. J.) • Charlotte (N. C.) • Chicago • Cleveland Denver • Houston • Kansas City • Los Angeles • Milwaukee • Minneapolis • Monterzuma (Ga.) • Philadelphia Pittsburgh • Providence (R. I.) • San Francisco • St. Louis • Utica (N.Y.) • Wenatchee (Wash.) • Yakima (Wash.)
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver



Johnson Joints with syphon-pipe drainage on a corrugator.

A BIG ORDER—*but we filled it!*

● It was our intimate knowledge of the needs of the paper mill that led to the development of the Johnson Rotary Pressure Joint. We knew the troubles that were experienced with the old-time "steam fits"—the frequent repair and replacement; the oiling and adjusting. We knew that operating men would welcome a long-lived, oil-less, self-adjusting, self-aligning joint.

From the standpoint of design it was a large order—but we filled it, and today scores of mills know the difference between the old steam fits that led a short life and a miserable one, as contrasted with this new type that lives a long life and a happy one.

Surely you are taking advantage of this development. If not, write today for the time and dollar-saving details.

Product of The Johnson Corporation

845 WOOD STREET, THREE RIVERS, MICHIGAN

BRIEFS

▶▶▶ THE MUSEUM OF SCIENCE AND INDUSTRY, Chicago, was the scene of the forty-third annual commencement exercises of the Armour Institute of Technology on June 8. Special honors were accorded Edwin J. Loutzenhesier, Chicago student, who achieved the highest scholastic ranking in the chemical engineering department at Armour.

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▶▶▶ ONE THOUSAND NEW FREIGHT CARS, 400 of which will be especially designed for hauling paper, have been purchased by the Boston & Maine and the Maine Central Railroad lines, it was announced by J. W. Smith, vice president of the combined lines.

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▶▶▶ THE SILVER PACKAGE that Charlie McCarthy announced recently over the radio to a nation-wide audience is being made at the Beveridge-Marvellum Company's plant at South Hadley Falls, Massachusetts. It is an aluminum coated paper which is being used by Chase and Sanborn in the distribution of its product.

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DARD HUNTER MUSEUM VIEWED BY N. E. TAPPI

A preliminary view of the Dard Hunter Paper Museum in the Architectural Building of the Massachusetts Institute of Technology was enjoyed by the New England section of TAPPI on May 19. Mr. Hunter, who attended the meetings, explained the various replicas of papermaking equipment and hand-made papermaking pieces. The session's program was printed on a beautiful sheet of Mr. Hunter's hand-made product. The New England TAPPI was privileged to view the Museum before its formal dedication, which was held June 5.

▶▶▶ WHILE THE ESTABLISHMENT OF A PULP AND PAPER MILL at Prince Rupert, B. C., is still a definite project, it is now evident that no immediate action will be taken in this connection. Up to last September it was hoped that an early start would be possible, but unsettled European conditions have rendered British capital reluctant to further commitments.

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▶▶▶ PROGRESS IS BEING ACHIEVED in the securing of the type of stream pollution legislation sought by the paper industry. Bills which are essentially meeting the wish of the paper industry for thorough study of the problem before any restrictive legislation is enacted, seem slated for passage in both the Senate and Congress.

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▶▶▶ NO OFFERS WERE RECEIVED by G. S. Currie, receiver of the Lake Sulphite Pulp Company, Red Rock, Ontario, for rehabilitation of the property. It is known that at least one group is interested in rehabilitation, and when conditions improve, especially in the sulphite industry, it is hoped a scheme of reorganization will be placed before the receiver.

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▶▶▶ THE NEKOOSA-EDWARDS PAPER COMPANY, Port Edwards, Wisconsin, has issued a handbook to its 1,200 employees. The handbook contains the entire text of the contract between the company and the unions, first aid directions and illustrations, rules and regulations of the Nepco Employees' Mutual Benefit Association, fire signals, safety guides, etc.

▶▶▶ THE NEKOOSA-EDWARDS PAPER COMPANY, of Port Edwards and Nekoosa, Wisconsin, is now planting more trees each year than the approximately 3,500,000 trees the two mills consume each year, according to Chief Forester F. G. Kilp. At the present time, Nekoosa-Edwards has about 75 miles of fire land roads constructed through 28,000 acres of forest land.

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▶▶▶ THAT PAPER MILL EXECUTIVES PREFER GOLF to the game of bridge seems to be indicated by the actions of those in attendance at the Fourth Annual Conference held recently at the Institute of Paper Chemistry at Appleton, Wisconsin. Twenty-two of the officials participated in the golf tourney, while the bridge affair was so sparse of entries that it had to be called off.

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H & W BUYS EQUIPMENT FOR MOBILE

The Hollingsworth and Whitney Company have confirmed the purchase of four digesters from the Blaw-Knox Company for the H & W mill to be erected at Mobile, Alabama. The digesters are to be of unusually large size, 11 feet inside diameter by 47 feet long, and will be annealed and tested up to 300 pounds hydrostatic pressure. All-welded construction will be employed and all welds are to be inspected by X-ray.

The Improved Paper Mill Machinery Company of Nashua, New Hampshire, has most of the pulp handling equipment orders for the new kraft mill. Further information as to the width of the paper machine, which is to be built by Pusey and Jones, can be gleaned from the screen width, which is some 180 or 184 inches.

ADVERTISING PAGES REMOVED

Editorial

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THE COUNTRY NEEDS NEW LEADERSHIP

▸▸▸ ANOTHER MONTH has gone into the "march of time" and still there is "no world war" and the likelihood of any such catastrophe is fading irrevocably. Mr. Hitler took no action over the shooting of a German in the Danzig area, although such shooting was presumed to be just the made-to-order incident which he was supposed to want in order to march his troops into Danzig for another bloodless annexation of territory, all of which proves the contention of this column that there is to be no war and there never was a world war contemplated except by saber rattlers in other countries than the Rome-Berlin axis, who wished to distract the attention of their inhabitants from the failures of their domestic policies. In other words, the familiar old political practice of drawing a red herring across the domestic trail was the war scare motive.

What arouses the ire of American business men and industrialists is the wholly indefensible tactics of our own political leaders in giving governmental countenance to these unfounded "rumors of war" and thus furthering the break-down in our business volume, causing a further curtailment thereof; bringing additional loss of operations and contraction of value at a time when these same political leaders should have counseled American industry to stand firm and to ignore the groundless war scares which were current sixty days ago. The lesson of the past two months is that our present administration is as fallible in the realm of foreign relationships as it has been in the matter of domestic relationships. In both fields, it is thoroughly discredited. Its assumed leadership has proved inimical and disastrous to American business recovery.

General business now is making its own recovery from the recent senseless war-scare depression. It was entirely unnecessary to superimpose an unwarranted war scare upon the people of the United States in order to get appropriations through Congress for the national defense. The people of America are as truly informed on the matter of European politics as the administration is, and from a warranted outcome of events, they have a more certain conviction. They will subscribe billions for defense, but not a dime for war. They understand without any gratuitous advice from ballyhooing politicians that the best avoidance of war is the best and most adequate defense.

No nation is going to attack the United States and no nations nor combination of nations has the territory to even think of attacking this country. We understand that the surest way to keep America the greatest beneficent nation in the world, is to attend to our own business here in America and to build our business up to that high eminence for which it was headed until this present administration temporarily thwarted our domestic progress.

The foreign war scares are punctured bunk. The immediate job confronting us is the building of an adequate defense against war and the rebuilding of our domestic business. The rebuilding of this country's business is the big job, for no foreign war could have cost us more in morale and money than the past seven years of uneconomic political usurpation has done.

"The Country needs new leadership!"

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A MANAGEMENT HAZARD

▸▸▸ SAFE OPERATING PRACTICES have been stressed considerably in the pulp and paper mills of the country for at least the last twenty-five years. During this time numerous improvements in machine design have tended to minimize the number of accidents. Likewise, the working force in many of the mills, because of the proper attitude toward safety on the part of the management, has become safety conscious. As a result, accidents have decreased considerably; and some few mills have been known to operate over a 12-month period and more without a lost-time accident to mar their safety records.

This accomplishment, splendid as it is, relates only to the physical protection of the individual mill employee. There is another hazard, however, that is just as vital, yet it relates to the protection of the mill organization itself. It is a hazard common to all industry, a hazard that is familiar to every executive from the lowest to the highest. It is a hazard that cannot be eliminated by machine guarding or through safety instruction of the ordinary sort. It is a hazard prompted by jealousy on the part of a mill employee or group of mill employees for a fellow employee or superior or by dissatisfaction of one sort or another on the part of one or more employees of working conditions within the plant.

The seriousness of such a hazard is difficult to measure. It can be minimized only by developing harmonious relations between fellow employees and between employees and the organization of which they are a part. When harmony prevails within an organization, it is a most valuable, though intangible asset.

CURRENT THOUGHT

RANDOM THOUGHTS . . . .

WILLIAM SIBLEY

WHO buys what and how much? That is the question which has bothered ceaselessly, all experts and near-experts in advertising, marketing and merchandising. We have some twenty-nine million families in the United States, plus over ten million single individuals who, collectively, make up nearly thirty million "consumer units." And the segregating of the sheep from the goats—the dividing of the "upper" income group from the "middle group" and the "lower group" is both a moot question and a serious matter. Especially for the people who have things to sell. They must know, at least approximately, where their market is in order to select advertising media of the kind that will most economically reach their assigned field. Along this line of thinking here are some figures which you will find interesting, and perhaps illuminating. The source for these figures is the National Resources Committee: "Consumers' Incomes in the U. S., Their Distribution in 1935-6." Found in this breakdown of incomes also will be found some interesting comparisons regarding particular purchases of individual types of equipment. I cite only three classifications: first, the per cent of population (or "consumer units") at each level; second, the percentage of sales of two kinds of electric refrigerators made by each income level; and third, the percentage of sales each level is responsible for in the single item of "Household Furnishings and Equipment." The figures are as follows:

Income Groups	Number Consumer Units	Pct. at Each Level	Pct. of G. E. Refrig. Sales	Pct. of Frigidaire Sales	Pct. of Household Furnishings Sales
$5,000 and over	926,648	2.4	2.0	0.7	12.6
$3,000 to $4,999	1,818,269	4.6	7.2	4.9	13.8
$2,000 to $2,999	4,434,085	11.2	20.4	21.5	25.0
$1,000 to $1,999	13,920,349	35.3	55.6	62.2	39.4
Under $1,000	18,358,949	46.5	13.8	10.7	9.2

Here are some figures worthy of study and cogitation. Normally, electric refrigerators might be considered not only a luxury item, but a piece of household equipment which would be in the high-priced-unit bracket. But in the case of the Frigidaire, nearly three-fourths of all refrigerators are sold to people with incomes of less than two thousand dollars a year. To me that's a very surprising fact and one which gives me pause to more seriously consider the "low-income" folks as a market for my product, or the products I help to sell.

▶▶▶ Here is another little fact which evidences the importance of "low-income" people in the matter of "high-unit sale" merchandise. Take the matter of typewriters. I have been told that one prominent typewriter manufacturer (years ago when word-machines were young and less efficient) used to arrange with business colleges to supply them with 50 per cent of their machines free of first cost and free of maintenance expense, if such schools would guarantee to use that particular make of machine up to 75 per cent of the machines in the college. Naturally, many schools took advantage of this liberal offer and thereby educated many budding stenographers to the merits and advantages and conveniences of that one typewriter. . . . And it was the stenographers who bought the machines. Not in the matter of signing requisitions or checks in payment therefor, but in influencing their bosses and employers to buy the machines they were most accustomed to and on which they could do the best work. In spite of the fact that this business college free-typewriter policy no longer remains in force, the magazine *True Story* reports that the lowly steno is responsible for the selection of at least 45 per cent of all typewriters used.

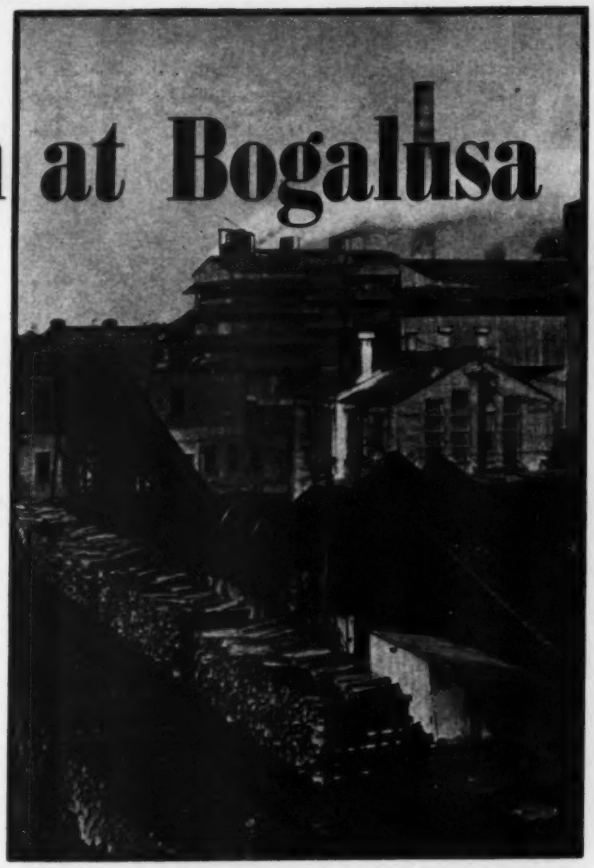
▶▶▶ This morning when I came to work there was nothing visibly the matter with Grand Avenue, a thoroughfare along which I travel about two blocks. Just now when I went down to buy a newspaper, I was amazed to find that one-half the entire street, for a distance of those same two blocks was torn to bits. . . . That a noisy power shovel was digging up the brick and concrete pavement in huge chunks, loading it into large trucks, and sending it away to the dump heap. It seems that the public utility wants to relay the street car tracks and they must start with a new foundation. But the point is this: Work still can be done rapidly, efficiently, and at relatively small cost; and with all the WPA and PWA projects around us, we sometimes lose sight of that fact. Had this been a governmental project, the streets would have been cluttered with a hundred men or more, armed with picks and axes and shovels and mauls—and those men would have been "busy" digging up that length of pavement for at least another six weeks. And here it is being done with one machine, one operator, three assistants, one foreman and a fleet of trucks (the latter no larger than would have been required by the government). It has always seemed a shame to me that the government projects, undertaken in the name of relief, could not be projects carried forward by efficient machinery. Pneumatic drills or powerful shovels to dig up pavement; conveyor loaders for the lighter, finer materials, etc., rather than the clumsy pick and shovel—the latter assigned merely to make the job last longer and increase the number of men needed per job. Had efficient machinery been employed by the government during the past six years our machinery manufacturers would have hired more men, the steel companies would have had larger forces, and the money saved through efficiency would have made possible three needed projects where only two bloom now.

ADVERTISING PAGES REMOVED

How they planned

Modernization at Bogalusa

B. B. PIERCE, Asst. Chief Engineer
Gaylord Container Corporation (Mill Div.)



View of mill with barking drum installation in center foreground.

IN the heart of a vast section of what appeared to be an inexhaustible supply of virgin longleaf yellow pine timber, the Great Southern Lumber Company, in 1905, built one of the world's largest sawmills and founded a community which became known as Bogalusa, a city in Washington Parish about seventy miles north of New Orleans, Louisiana. The officials of this company were endowed with unusual foresight and keen vision, and they soon realized that the supply of saw logs was limited. In the very beginning, they wisely adopted a policy of conservative logging and consistent reforestation of cut-over lands.

In line with its policy of progress and expansion, the Great Southern Lumber Company formed a subsidiary known as the Bogalusa Paper Company, and during 1916 and 1917 the original mill of the paper company was built adjacent to the great sawmill of the parent organization. This plant was an integrated sulphate pulp and paper mill with two board machines. The pulp mill had a capacity of about sixty tons a day. Both of the board machines were six-cylinder units; one had a width of 124 in., the other, 118 in.

The power plant of the mill consisted of ten horizontal return tubular boilers and three 850 kv.-a. steam engine generators. The ten boilers, which were operated at 150 pounds steam pressure, were fired with sawmill and woodroom waste. A 1500 kv.-a. bank of transformers, receiving its power from the sawmill, helped to feed the paper mill.

▸▸▸ During 1919, a 106-in. cylinder machine was purchased from the Louisiana Fibre Board Company, which had operated a mill in another location in Bogalusa with varying degrees of success since 1913. This machine, installed as a pulp dryer, functioned as such until 1924, when it was converted into a specialty machine.

In 1924, a 164-in. fourdrinier machine was installed to produce bag and wrapping paper. The building which housed this machine was left so that it could be extended to accommodate a sister machine.

A building to house the experimental laboratory was erected during 1926. This laboratory has played an important part in the advancement of the mill.

By this time, the power plant had been increased by the installation of three 1000-hp., 150-lb. pressure, wood-fired boilers and two 2500-kw. turbogenerators. In 1926, a 450-lb. pressure, 1000-hp. boiler and a 4000-kw. extraction and condensing type turbo-generator operating at 450-lb. throttle pressure were installed. In 1929, a substation was built in the mill and power was purchased from a utility company.

Also, during 1929, a semi-chemical pulp mill was built and a 124-in. cylinder machine was installed to manufacture paper from this pulp. Waste from the sawmill provided the raw material for the semi-chemical pulp mill.

▸▸▸ During 1930, the second fourdrinier machine was installed and the digester room was rebuilt. In the rebuilding of the digester room, four new digesters were installed; the eight old ones erected on new structural steel supports, and the chip bins above the digesters changed from wood construction to steel plate construction. All operating floors were of steel and concrete construction.

Two sludge reburning kilns were installed in 1932 to recover lime from the sludge from the settling tanks of a batch causticizing system. For years previously, sludge, which was suitable for reburning and re-use, had been collected in an immense pile near the mill. A green liquor clarification system followed soon after the lime reburning equipment was installed.

In the construction program of 1933, special attention was given to the power plant and to the recovery equipment. In the power plant, the "topping turbine" principle was carried out farther than it had been before. A 7500-kw. turbogenerator, arranged for 450-lb. throttle pressure, 150-lb. extraction, and 25-lb. exhaust, was installed, the process lines to the mill being 150-lb. and 25-lb. pressure.

The selection of 450-lb. pressure for the new equipment

Among the pioneer mills of the sulphate industry of this country, the pulp and paper mill of the Gaylord Container Corporation at Bogalusa, Louisiana, stands out prominently. In this article, the author graphically relates the development of the Bogalusa mill which has paralleled modern trends and moved with the progress of the industry.—EDITOR'S NOTE.

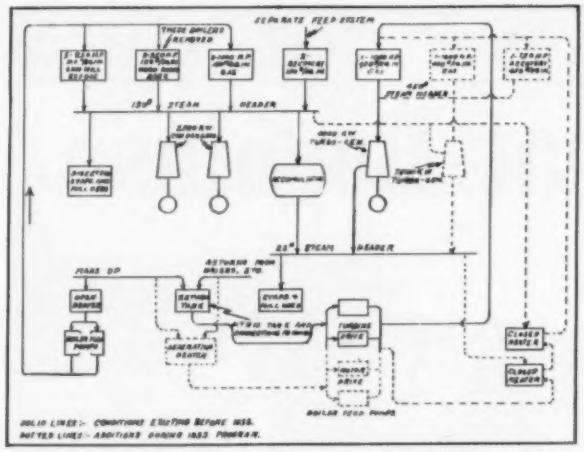


Diagram showing how power plant was modernized.

was influenced by the presence of the existing 450-lb. pressure boiler and the turbine. Had it not been advantageous to operate the old and the new equipment together, a higher pressure would have been more economical.

Steam to the new turbine was supplied by the installation of a 1000-hp., 450-lb. steam pressure, 700-deg. total steam temperature boiler.

The new power equipment showed a daily saving of about $750 in power cost.

The electrical distribution system, of course, had to be adapted to the new system of power production. The power house contained a 440-bolt bus supplied from the turbine and engine generators, and a 2300-volt bus supplied from the sawmill and the utility company.

With the new 7500-kw. generating unit installed in the space where the three engine generators had been, it was thought desirable to generate a large proportion of the total energy requirement of the mill. To accomplish this purpose, a new 2300-volt bus and switching equipment were installed, the 440-volt distribution system outside the power house was practically eliminated, and replaced with a 2300-volt system; and the generators on the three existing turbines were rewound for 2300 volts.

In the recovery process, the evaporator room capacity was increased by the addition of three vertical tube bodies to an existing forced circulation evaporator to make a quadruple effect system.

The recovery furnaces at this time consisted of seven old rotaries and two small waste heat boilers generating steam at 150-lb. pressure. To this installation, a 750-hp. black liquor recovery boiler operating at 450-lb. pressure was added. This unit was arranged for gas firing.

About this time, the No. 1 paper machine was rebuilt completely. The old wet end was removed and sold, and a new one of modern design was installed. The dryer section was re-arranged to include a size press. All old open-geared drives were replaced by enclosed gear drives.

▶▶▶ During 1935, the old woodroom was discarded, and a new one built about it while it was still in production. One of the outstanding features of the new woodroom is that one operator, standing in a crow's nest high above the chipper installation, can see and control all of the equipment both inside the woodroom and in the wood yard.

A wood yard conveyor carries the wood from the yard to inverted V-shaped chutes into two barking drums. Another similar conveyor carries the barked wood after it falls from the barking drums to inverted V-shaped chutes into two chippers, the chipper disc of each chipper being directly connected to a 250-hp., 257-r.p.m. synchronous motor. The chips fall by gravity from the chippers onto chip screens. It has been proved that this arrangement has advantages over the old system, where chips were elevated from the chippers to the screens.

After screening, the over-sized chips are conveyed to a rechipper; properly sized chips fall on a conveyor belt and are taken to the chip bins above the digesters; and all sawdust is blown by air to the boiler house fuel bins.

By 1936, the pulp mill capacity was lagging behind that of the paper machines. The capacity of the machines had been built up gradually by improvement after improvement, such as the rebuilding of the No. 1 machine (already cited), the addition of dryers to the No. 3, No. 4, and No. 5 machines, and the installation of an improved fourdrinier on the No. 5 machine.

After a thorough study of the pulp mill, it was decided that the bottle necks which were impairing production most seriously were: digesters, diffusers, evaporators, chemical recovery furnaces, causticizing and lime reburning systems. In the midst of a construction program carried out to correct these conditions, on June 16, 1937, the Bogalusa Paper Company was consolidated with Robert Gaylord, Incorporated, to form the Gaylord Container Corporation.

▶▶▶ The mill at Bogalusa, known since the consolidation as the Mill Division of the Gaylord Container Corporation, continues to manufacture linerboard, chipboard, corrugating materials, wrapping and bag paper, board and paper specialties, as well as two by-products, turpentine, and a product known as liquid rosin. The corrugated and solid fiber shipping containers, corrugated and solid fiber packing materials and specialties, paper bags and sacks, and dry and paraffined folding cartons, are manufactured at the plants of the company, or its subsidiaries, at St. Louis, Bogalusa, Jersey City, Dallas, Atlanta, Houston, Tampa, and Milwaukee.

The Gaylord Container Corporation owns approximately 260,000 acres of reforested land within a radius of approximately one hundred miles of Bogalusa. Except for 1400 acres purchased in 1937, this land was transferred to the former Bogalusa Paper Company by the Great Southern Lumber Company between 1934 and 1937. Approximately 30,000 acres of these reforested areas were planted by hand; the remainder was restocked naturally.

There are good stands of yellow pine suitable for paper manufacture in southeastern Louisiana and southern Mississippi within a radius of approximately 200 to 250 miles of Bogalusa. The supply of pulpwood on company-owned land is being held in reserve at present, most of the wood requirements of the mill being satisfied from outside sources.

The company maintains an efficient forestry department. Thinnings from the reforested lands now serve as raw material for the manufacture of pulp.

At the time that the pulp mill was being studied for improvements, it was evident that the eight original digesters had become too thin for further safe operation. Ten new digesters, therefore, were installed early in 1938.

▶▶▶ The installation of these ten new digesters in the old digester room, without too long a shutdown, presented a very difficult problem. The twelve old digesters were arranged in two parallel rows of six each. The first two digesters on one end of each row comprised the four which were installed in 1930. These digesters were in good condition. Therefore, they were left in service. At the opposite end of each row, a space and support had been provided in 1930 for two additional digesters. These two digesters were set in place and the two old digesters next to the new ones were replaced before the shutdown.

All piping for connecting the new digesters was fabricated. The twelve old digesters had been blown through two six-way valves, and since there were now fourteen

digesters, one of the six-way valves had to be replaced by an eight-way valve. This was made ready before the shutdown of the mill. Likewise, all rigging to handle the digesters was hung in place. After the shutdown, six hours were required for disconnecting the six old digesters. Then, as each was taken out, a new one was swung into place with the same rigging. This operation required only eighteen hours. Thirty-six hours more were required to level up the digesters, and to install the piping and blow valve. This job is typical of the planning and preliminary work which must be done to prevent long shutdowns while changing equipment which is on production.

The diffuser capacity of the units that had been impairing production was made up of two diffuser groups, one with twelve diffusers and one with eight diffusers. These diffusers were set around a circular stock chest, the dumping doors of the diffusers opening into this chest. The stock came into the top of the diffusers through a swivel pipe from a cyclone above, into which the digesters were blown.

The new diffuser room contains fourteen diffusers. All the good points and all the improvements which could be thought of from experience with the two old diffuser rooms were incorporated in the design of the new diffuser room.

The stock chest was built with the bottom sloping from two opposite sides toward a center valley. This valley slopes to one end where the outlet to the stock pump is located. The agitator shaft was built of 10-in. extra heavy piping. The pipe was turned true at the bearings. The shaft extends through a suitable packing gland at one end where the drive sprocket is attached.

The dumping floor is of steel floor grating, and has proved very satisfactory for this purpose.

Very convenient platforms were provided for getting to the packing gland on the swivel joint under the cyclone and for getting to the outside of the cyclone for clean up and repairs.

▶▶▶ The evaporator room (another of the bottle necks) housed three evaporator units: one old type, castiron body, triple-effect; one old, quadruple-effect; and the later design long-tube, vertical, quadruple-effect, installed in 1933. To eliminate this bottle neck, a new and much larger quintuple effect long-tube evaporator system was installed to replace all the other evaporating equipment. The latest of the old equipment, however, was held in reserve for standby purposes.

Likewise, in the recovery room, two of the old rotary furnaces were removed and two waste heat recovery boilers were installed in their place. After the recovery boiler installation was made each boiler unit being of 820 hp. and generating steam at 450 lb., the use of all of the old rotary recovery furnaces was discontinued.

The black liquor is sprayed into the new furnaces by a moving nozzle, which is arranged so that it distributes the liquor evenly within the furnace.

The furnace is completely water-walled with studded tubes. Chrome ore refractory is packed around the tubes, the studs serving the purpose of holding the chrome ore. The gases pass from the furnace through a short connecting bridge, which, likewise, is water-walled, then through superheater tubes and into the main boiler setting. The boiler drums are set parallel with the gas flow to facilitate lancing between the tubes through doors provided for this purpose.

After passing through the boiler, the gasses are pulled through an air preheater, then pushed by an induced draft fan down through a spray tower, which serves the purpose of washing the gases and evaporating some water from the spray liquor. From the bottom of the spray tower, the gases pass through a steel stack to the atmosphere.

Previous to this time, the causticizing system of the mill was of the batch type with a capacity of 250 to 270 tons

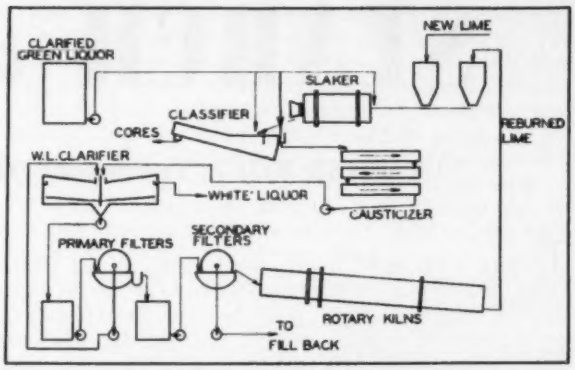


Diagram showing flow of materials through modernized causticizing system.

of pulp per day. In line with modernization plans, and to increase capacity and effect economy of labor and chemicals, the causticizing system was converted to the continuous method of causticizing with lime recovery.

The problem presented in the design of the new causticizing arrangement was to convert continuously clarified green liquor to digester cooking liquor, and to utilize as much existing equipment as possible.

▶▶▶ A brief description of the equipment and the flow through the new causticizing system follows:

A portion of the clarified green liquor is supplied to a lime slaker along with a controlled amount of reburned lime, and the new lime required for make-up. The slurry from the slaker is discharged into a classifier and the remaining portion of the green liquor is added in the classifier. The solid impurities in the slurry are removed by the classifier, which is merely an inclined screw conveyor. The slaked lime and liquor is discharged to the causticizer. The causticizer departs from the conventional agitator equipped causticizing tank, usually heated by steam coils. It is a three-section horizontal reaction unit with gravity flow between the units which are installed at different levels. Each section is equipped with a slow moving ribbon agitator. The heat is applied through ⅝-in. steel sidewalls by individually controlled steam jackets. The causticized liquor and sludge are pumped to the feed well of the white liquor clarifier. The underflow from the white liquor clarifier is fed directly to a rotary vacuum filter. The filtrate from this filter is returned to the feed well of the white liquor clarifier. The clear overflow from the white liquor clarifier is discharged to white liquor storage tanks and is later pumped to the digester room. The cake from the caustic liquor, or primary filters, is repulped with water and fed to secondary filters. These secondary filters are the old ones which have been set in a new location. The cake from these filters is conveyed to rotary kilns. The filtrate from the secondary filters is used for fillback in the dissolving tanks on the recovery furnaces.

The pulp mill, after this modernization program, has a capacity of approximately 400 tons per day, which is more than enough to supply the paper machines.

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CORRECTION

It is regretted that a typographical error appeared in the article entitled "Note on Freeness Interconversion," which appeared on Page 160 of the May issue of this magazine.

The equation which appeared as the third line from the top of the second column of this article should have read:

$$P = 183.5 - 0.2386\,F + 10^{3.084 - 0.00791\,F}$$

STARCH *and* PAPER

FRED HOLT, Technical Director, Brown-Bridge Mills

THERE ARE FEW, if any, starch products used in the paper industry that are perfectly adapted to the use to which they are being put. Starch products in use today, however, are far superior to those used ten years or even five years ago. Fundamentally, now little more is known about starch or about the interaction of starch and paper than was known ten years ago. Some work has been done on molecular weight determination without any very definite results being obtained. The best investigators do not agree on the physical structure of the starch granule, nor do they see eye to eye as to the chemical changes in the molecule when starch is converted to one of its many end products.

Yet, in spite of having to work with a material with which there is merely a nodding acquaintance, much progress has been made if we consider such the production of products of greater utility.

Beater Starches

Starches are being added in the beater on many grades of paper and for a diversity of reasons. In a kraft sheet they increase the rattle, sizing, and Mullen, and improve the finish. Their purpose in a book furnish is to keep down the fuzz and possibly to increase the Mullen slightly. In liner board, they improve the finish and increase the scuff resistance. They improve the sizing, folding and rattle qualities in bonds; and increase stiffness and lay the fuzz in bristols. In addition, on all grades, if enough starch is added so that the freeness of the pulp is decreased, there will be a decided improvement in formation.

The problem of retention on the wire is purely physical. Starch may be present in such a form that the enmeshed fibers on the wire will filter out the granules from the water dropping through; or starch may be attached to the surface of the cellulose in such a manner that the mutual attraction will resist successfully any washing on the wire tending to separate them.

It is quite possible to swell starch so that the granules become tremendously enlarged, yet retain the granular form. Sjostrom's microphotographs (*1*) indicate the great size which the granules may attain without being disintegrated. Lee (*2*) also has made some fine microphotographs and sketches in color showing the enmeshing of starch particles by paper fibers.

Treated starches can be cooked to yield the swollen unbroken granules. There also are available starches which have been swollen without cooking. These cold process starches are preferred by the author. They have a much higher adhesive strength and a very high viscosity. They are completely swollen and are easily mixed with the stock in the beater. Very small amounts of water can be used with them, which is a decided improvement over cooked starches where large quantities of water must be added.

Precipitation of starch in the beater has been practiced for a long time. Rowland reports (*3*) "By using an excess of alum and alkali a complex starch-alumina gelatinous precipitate is formed in the beater. This is easily retained on the wire and gives abnormally high strength, good feel and rattle and no fuzz. The pulp is slower and requires a little more drying."

When starch is added to furnishes carrying filler, it adds an adhesive strength that helps to bind the filler in the sheet so that a high ash can be carried. There is a question as to whether the retention of filler or pigment is higher in the presence of starch; but the improved bonding of the filler that is retained is well established.

The effectiveness of rosin sizing depends upon the dispersion of the particles and upon their size. It is the opinion of many that soluble starches will help rosin sizing if added before the rosin. The protective colloid power of the starch is thus fully developed and the rosin is precipitated in much finer state. In consequence, the surface area of the precipitated particles is enormously increased (*4*). The action here is the same as in the electro-deposition of metals where a very small amount of dissolved colloid helps to deposit the metal in a much finer grain and improves the distribution.

In order to perform the service of a protective colloid, the starch must be soluble, forming a colloidal solution. An insoluble suspension of boiled raw flour has no protective action.

Lee found (*2*) under the microscope that, in the case he was discussing, the rosin was rather coarsely precipitated, and that rosin was precipitated in much finer form in papers containing no starch. Now it is quite possible that in the case of the coarse rosin size it was a poorly dispersed size and/or that the type of starch product used was not soluble enough to have any protective action. However, Lee's observations bring up a reasonable doubt as to the protective value of starch in rosin sizing. Therefore, more work should be done before arriving at a definite conclusion.

Tub Sizing

Tub sizing is a tool of the papermaker that is being used religiously only on a few items. The author agrees with Shoals, who writes (*5*) "It is my opinion that tub sizing is one part of paper making which can be elaborated upon and can be used as in the finishing of textile fabrics. Almost any finish can be applied to paper, I believe, by the use of proper finishing materials. There is no reason why softeners should not be used to make a limp and easily folded sheet; hardening materials used for stiffer paper. Increased crackle, stiffness and tensile strength, I believe, can be improved remarkably if the proper effort is put into tub sizing."

The so-called soluble starches and thin boiling starches are the ones commonly being used for tub sizing. "Soluble" is a misnomer, as the starches to which the term is applied are not soluble starches, but have to be cooked. Their viscosities have been broken down by previous chemical treatment, so that when cooked in water they form thin solutions. The main difference between those in use is in viscosity when cooked.

These products, due to their low viscosities, have high penetrating powers. According to Cobb (*6*), the degree of penetration of starch into the sheet at the size press varies inversely as the square root of the viscosity of the dispersion. The viscosity is due to the suspension of whole and broken granules and is not that of a homogeneous liquid. Due to chemical treatment, the thin boiling starch has less tendency to hydration than raw starch and it swells less. "Therefore, the room occupied by the suspended starch is smaller in rela-

tion to the total volume . . . and the paste is correspondingly thinner." (*2*). The more viscous the solution, the more the starch has swollen.

When the starch dries, it shrinks; and the more the starch is swollen, the greater is the shrinkage. It is the opinion of Lee (*2*) that in all probability a continuous film of starch of measurable thickness does not occur in ordinary papers. The thickness of the deposit varies considerably and even may be discontinuous. Although micro examination commonly shows broken films, they actually may be much more continuous than appears. The deposit could be there, yet be so thin it could not be detected under the microscope. The more the starch shrinks, the more shrinkage it causes in the paper, giving a greater increase in strength over the starch with less shrinkage. This is true up to the point where the shrinkage is so great that the dried film is discontinuous. In a case like this, the sheet may be weaker than it would be without any starch.

The increase in strength afforded by starch reaches a maximum at a definite concentration of starch. This fact is shown clearly by Cobb's charts (*6*). In these graphs the Mullen and pick tests both go through maximums at low concentrations of starch.

To increase retention of starch and filler, Strasser (*7*) has invented a device which distributes starch, filler or a mixture of both on the moving web as it is formed on the wire. This procedure does not disturb the formation and greatly increases the retention. It is claimed that this invention enables one to duplicate the qualities obtained on a size press at about one-tenth the cost. By using this equipment, of which there are two or three installations in successful operation, it is not necessary to have a closed white water system (*15*).

Enzymatic Conversion

Enzymatic conversion is a method of production of converted starch products which may hold the greatest future of all. There still are problems connected with its use. The uniformity of the product cannot be held as close as can be done by other converting methods. Several new enzymes are needed to produce products not now available by this process. This work is being attacked and the author has great hopes for its success.

An enzyme is an inert organic chemical produced by a living organism. Diehm (*8*) believes that an enzyme is composed of two parts: (*1*), a protein portion acting as a catalyst; and (*2*), different active groups attached to the protein, which determine the exact action of the enzyme; i.e., on what material it will act and what the end products will be.

Enzymes as a whole affect several different types of reactions, such as esterolysis, reduction, oxidation and hydrolysis, but any one enzyme will do only one job.

The enzymes that act on starch are known as "amylases" or "diastases." These enzymes probably form some complex with the starch until the latter is hydrolyzed to the end product. Then they leave and attach themselves to another starch molecule. The amylases differ in action from one another. One type hydrolyzes starch by splitting off one molecule of sugar after another from the end of the molecular chain. Another type halves the molecule (*9*).

A satisfactory enzyme must have the following properties: (1) be active at the gelatinization temperature of the starch, (2) be economical, (3) form a minimum amount of sugar, (4) form gums with equal or better qualities than those prepared by other methods, and (5) be easily inactivated at the end of the conversion.

At a given pH, a definite per cent of an enzyme acting for a given time at a fixed temperature will always give the same end product. A change in any one of these factors causes a change in the product.

Another factor that will cause variations from one batch to another is non-uniformity of the raw starch itself. Raw starch is not always as constant as the operator believes, especially if low grades of flour are used. Shipments of flour should be tested for fiber and viscosity so that the enzymatic treatment may be varied to obtain a uniform product.

Another point that might be mentioned is that control is easier with dilute suspensions than with concentrated. It also is important to avoid contact of the suspension with any materials that inactivate the enzyme. Salts of the heavy metals are especially bad in this respect.

The advantage in the use of enzymatic conversion is principally in the cost. Yet with this low cost, the gums are not at all inferior to those prepared by other methods.

In adhesive power the gums match oxidized starches and are better than dextrins (*10*). Papers sized with enzyme converted starches show good Mullen, tear and opacity, and are well sized. It is claimed that these converted products have a better water resistance than those converted by other means (*9*).

A diversity of products is possible by changing enzymes or by varying the other factors in the process. Different fluidities can be made for tub sizing different grades of paper. Laminating pastes can be produced containing 50-50 per cent solids.

Calender sizes with low solids are available, and excellent gums for coated papers have been produced.

Substantial progress has been made in this art of conversion in the past few years and there is no reason to believe that this development is at an end.

Coated Papers

More and more starch is being used in coated papers. This increase has not been due to the gradual replacement of casein by starch in the old line papers, but has come with the advent of the fourdrinier coated sheet, a new and different paper. Starch is well suited to this process and a fine sheet is being made with it. Starch also has excellent printing qualities, especially with the "flash" printing methods used by some publications. Under these conditions, it functions better than casein (*11*).

Possibly there has been some swing from casein to starch in a few of the regular cheaper coated papers, but this change has been small and of little significance. The author feels that the right starch product should be able to do the job as well as casein, but undoubtedly there is a long way to go and a great deal of work to be done before this will be an accomplished fact. Results are not being produced as rapidly on this project as on some others. While certain improvements in the starch products have been made, and while starch certainly has a place in a few lines of coated papers, the elimination of casein is not at hand. When the price of casein rises, however, greater recognition of starch for coating may be seen.

Corrugated Board

A little more than four years ago, the corrugated box industry was presented with a new starch adhesive to replace silicate on corrugating machines. Today, more than half of the corrugated board produced is made by using starch in this operation. In addition to lowering the board costs, the use of starch has added certain qualities never before obtainable.

Conventional starch adhesives had been in use before the birth of this adhesive for certain requirements in the board industry. These materials formed the bond by a gradual increase in viscosity as their moisture content was lowered by absorption in the paper or by evaporation. The dry film then had great adhesive properties. For single faced board, these adhesives could be used, when necessary.

In double backing, however, the bonding must be very rapid. Only a small amount of pressure must be used to prevent crushing; and a large amount of adhesive is necessary to form a satisfactory bond. Under these conditions, the regular starch adhesives would not work. They require great pressure and thin spreads with a reasonable amount of setting time to form the bond.

The new adhesive is a concentrated permanent fluid suspension of raw starch. Its free flowing characteristic is imparted by means of a hydrosol carrier; while its speed of set and its bonding effect as controlled by the addition of suitable chemicals. The material as it goes to the corrugator is not adhesive. If a film were dried out at room temperature, the result would be merely a layer of caked flour

The rolls at the point of junction of the linerboard with the corrugated sheet are steam heated. It is also possible to preheat the paper. When the layer of raw starch adhesive reaches the nip joining the liner and corrugated sheet, the heat from the rolls almost instantaneously explodes the starch, forming a viscous, very adhesive jelly. It was the ingenuity of forming the jelly when the starch reached the machine that made possible the use of such high concentrations of raw starch while retaining a free flowing fluid. The granules burst at a little above 150 deg. Fahr. so that the normal heating operation is all that is necessary.

The process has the advantages of eliminating scraping of double backer plates when changing sizes, and of increasing production where numerous changes are made. The speed of the machine is usually increased due to the quick set of the adhesive.

The board produced is 2 to 3 per cent lighter in weight, is unattractive to rodents and bacteria, will withstand very humid conditions (gelatinized raw starch is not soluble), has a superior Mullen, and is low in alkali. Special non-alkaline formulae are available. The lack of alkalinity increases the printability and removes any cause for complaint due to alkalinity of the carton.

This process definitely has been a step forward for the corrugating industry and the author looks for even more enthusiastic reception in the next year or two.

Gummed Paper

The latest product developed by a starch company for use in the paper industry is a gum (*14*) to replace animal glue in gummed tapes and flat papers. This gum is not to be confused with the dextrines which have been in use for years. The author being one of its developers, can state that it is unlike any other starch product in use today.

For many years it has been desirable to simulate the properties of animal glue, not with an inferior substitute but with a product which will have every desirable adhesive property of animal glue to the same degree or better. Many attempts have been made to produce such a material. It was not until late in 1938, however, that such a product was produced successfully on a commercial scale. This adhesive, when a dry film of it is remoistened, has the fibrous, quick-grab, fast-setting properties of animal glue. The material also is odorless and tasteless and has better mold resisting qualities. In addition, by the use of proper moistening solutions, the speed of set can be controlled. Since this product offers such definite advantages, it will be only a matter of time before animal glues will be replaced by starch products in the gumming industry.

What has been learned in developing this gum will be of benefit also to research on other remoistening gums. The project is not at an end. It has just begun. In a year or two years from now, great improvements in the present product may be expected and consequent drastic changes for the better in gums at all similar. Gumming is a new field for starch, but it will be a very valuable one.

Sweet Potato Starch

The United States Bureau of Chemistry and Soils has been working for several years on the development of sweet potato starch (*12*). This development would mean a new profitable industry for the South which would not affect our domestic grown starch but would compete with tapioca. The Japanese have produced sweet potato starch for a good many years, but their product is too yellow and has not been accepted here.

The starch produced by the Bureau of Chemistry and Soils is of very good quality. The color is good and the starch is well free of fiber. The Bureau has a plant in Mississippi which last year produced approximately 500,000 pounds (*12*). This production has been used up mostly in the textile industry and for trial runs on other materials. When used for slasher sizing of yarn the report was very favorable.

The National Bureau of Standards reports (*13*): "Papers sized with sweet potato starch were equal to the best papers sized with the other starches with respect to strength, opacity and degree of sizing—superior retention of mineral filler and closing the sheet as indicated by air permeability were obtained with sweet potato starch." An adhesive company, which had been experimenting with adhesives made from sweet potato starch, reported (*13*): "Sweet potato starch can be used instead of cassava in every branch of the manufacture of dextrin, vegetable glue and sizing."

There are many difficulties to be surmounted before everyone can be using this material. If only fresh potatoes are used, the starch plant has a season of about 100 days (*12*). Potatoes in storage convert the starch to sugar. There has been a process of dehydration worked out that seems to be helpful. By dehydrating the potatoes, they can be stored and the plant run over a longer season. There is also work going on to increase the yield of starch per acre which means the development of a potato with a higher starch content. This development is similar to that of the sugar beet with the higher yield.

Briefly, a few of the present problems regarding sweet potato starch have been cited. It cannot be bought today as cheaply as tapioca, but it is a future domestic product that will bear close watching. Before many years, everyone will be using it.

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Pulping with Nitric Acid

A Review

Part III—ECONOMICS OF THE PROCESS

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EDITOR'S NOTE—Part III is the concluding installment of this article. Parts I and II appeared in the April and May issues, respectively, of this magazine.

VERY little information is available on the economic aspects of the nitric acid pulping process. While many investigators have reported the recovery of various individual products, no one, except Lynch and Goss *(113)* and Payne *(127)*, has given any data on the over-all cost of this process. An attempt will be made here to outline the probable chemical cost from the data available in the literature and from work carried out in the U. S. Agricultural By-Products Laboratory.

The advantages of the nitric acid pulping process over the present commercial processes have been cited previously. The higher cost of using stainless steel equipment is probably more than offset by the fact that high-pressure steam and pressure equipment with their consequently greater operating hazards, upkeep, and insurance costs are unnecessary. As has been stated previously, the use of this process has already reached a commercial stage on wood and a semi-commercial stage on bagasse.

The cost of nitric acid has been reduced materially within the last few years, the market price having dropped from 11 cents per pound in 1920 to 7 cents per pound in 1938. However, the oxidation of anhydrous ammonia to obtain *dilute* nitric acid would reduce the cost to about 2 cents per pound, calculated as 100 per cent acid.

The consumption of nitric acid in the pulping process depends upon a number of factors, such as type of raw material, concentration of acid, time and temperature of treatment, reuse of the acid liquor, etc. The acid consumptions reported in the literature vary considerably. In pulping bagasse, consumptions of 1.25 per cent *(107)*, 7.5 per cent *(113)*, 15 per cent *(166)*, and 19 per cent *(51)* of nitric acid on the basis of the raw material have been reported. In the case of the alcoholic nitric acid process, the amount consumed was 8.5 to 10.2 per cent *(4)*. All of these figures were obtained from laboratory-scale data. Apparently no one has considered, on the economic basis, the recovery of the available nitrogen from both the used liquor and the evolved vapors. Most of the available data deal with the recovery of nitrogen compounds from the liquor on the erroneous assumption that all of the titratable acid in the liquor is nitric acid. Whittemore, Reid, and Lynch *(166)*, however, have determined the individual acid constituents of the used liquor and wash waters by means of conductometric titration. Using a 2 per cent nitric acid solution, they found that organic acids account for about 20 per cent of the titratable acidity of the used liquor after one use. During the reuse of the liquor or recovery by evaporation the lignin degradation products present are acted upon by the residual nitric acid and thus account for about one-fourth of the total nitric acid consumption. However, it appears to be more economical to reuse the liquor than to cook with a fresh charge each time. Furthermore, as previously pointed out, a number of investigators *(12*, 14*, 31*)* have reported that the used liquor is a better pulping agent. In using a 2.1 per cent nitric acid solution and on recovering the drain and the first wash liquors, the consumption of nitric acid was found to be 15 per cent or 300 pounds per ton of bagasse *(166)*.

At 7 cents per pound of 100 per cent nitric acid, it would cost $140 per ton. On the other hand, a ton of this acid can be produced from 600 pounds of anhydrous ammonia, quoted at 4.5 cents per pound. Lynch and Goss *(113)* stated that the total conversion cost would not exceed $10 per ton of nitric acid. Allowing a generous contingency factor of $4 per ton, the total cost of nitric acid produced from ammonia would be about $41 per ton.

The cost of the nitric acid consumed would be, therefore, $6.15 per ton of bagasse. On the basis of a 45 per cent yield of pulp, this cost would be about $13.70 per ton of pulp. Assuming that the regeneration of nitric acid from the nitrates in the liquor and from the nitrogen oxide vapors would cost less than its production from ammonia, the above cost of acid per ton of pulp would be lowered to some extent.

Payne *(127)*, assuming a 50 per cent recovery of the caustic soda used on the acid-treated material, calculated that the cost for alkali per ton of pulp would be $5 (200 pounds alkali at 2.5 cents per pound). With a chlorine consumption of 5 per cent and with chlorine at 1.55 cents per pound, the bleaching cost would be $1.55 per ton of pulp. On the basis of a 45 per cent yield of pulp, 2.2 tons of bagasse would be required per ton of pulp. At $7 per ton the raw material (delivered to the digesters) would cost $15.40 per ton of pulp. The total raw material and chemical cost would therefore be approximately $35.65 per ton of bagasse pulp. This figure is somewhat high because, as stated above, the nitric acid recovery by regeneration is not considered. Furthermore, the recovery of acetic and oxalic acids and nitrogenous aromatics should tend to lower this figure to some extent. The greatest discrepancy between this cost ($35.65) and those given by Lynch and Goss *(113)* and Payne *(127)* is due to the difference in the cost and consumption of nitric acid reported, as Lynch and Goss calculated approximately $9 and Payne $2 for the nitric acid consumed in the process.

The fibrous agricultural wastes such as bagasse, cornstalks, straw, etc., possess an advantage over wood in that they are less dense and thus require less disintegration in order that the pulping agent may penetrate the material readily. Although this bulkiness is disadvantageous because of the larger ratio of liquor to solid raw material required, it is possible to pulp these materials at fairly low ratios with mechanical circulation of the liquor.

Of the various agricultural wastes, bagasse has attracted

*Established by the Bureau of Chemistry and Soils, U. S. Department of Agriculture, in co-operation with the Iowa State College, Ames, Iowa.

the most attention in connection with the nitric acid process because it has the advantage over other agricultural waste materials of being concentrated at one place, the sugar mill. Furthermore, during the process of sugar extraction, bagasse is crushed and washed, and it is thus obtained in a more satisfactory condition for immediate pulping. The annual amount of bagasse produced in the United States and its possessions is about 3 to 3.5 million tons.

Conclusions

This review shows definitely that nitric acid pulping is passing rapidly from "just another laboratory method" for liberating the cellulose from fibrous plant materials to a commercial process with an excellent chance of competing, on an economic basis, with the soda, sulphite and sulphate processes. Many factors favor this process: the continually decreasing cost of nitric acid production, the perfection and lowered cost of acid-resistant alloys, the increased demand for cellulose and cellulosic products, and the intensive search for means of utilizing the enormous surplus of waste fibrous material from the annual agricultural crops. The lack of wood and cotton linters in some countries and of the usual pulping chemicals in others are additional factors which tend to make the nitric acid process attractive. Furthermore, the elimination of high-pressure equipment with the accompanying decrease in the operating hazards and costs are potent factors in favor of this process.

It is apparent, as evidenced by the data on bagasse, that the cost of production of pulp from fibrous plant materials by the nitric acid process is not prohibitive. With efficient recovery methods and further research on the optimum conditions for pulping, it appears highly probable that nitric acid pulp can be produced at least as cheaply as that obtained by the present commercial pulping processes.

The increasing importance of this process in the manufacture of pulp suitable for the various cellulose industries

(Concluded at bottom of page 343.)

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Table 9—Chronological Summary of the Literature and Patents on Pulping with Nitric Acid

The number in parentheses after the name refers to the literature citation at the end of this manuscript. Those numbers marked with an asterisk (*) refer to patents. The small letters in parentheses refer to explanatory remarks at the end of this table. A cross (+) indicates an unspecified concentration.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°	
1833	Braconnot (15)	Sawdust, etc	Concd.						Produced "xyloidine" (oxycellulose).
1838	Payen (126)	Oak and beechwood	Concd.	30	Normal	+			First to separate plant components and first to use alkali after-treatment.
1846	Mulder (122)	Wood and flax	Fuming	96					Obtained pure cellulose without nitrocompounds (?).
1849	Sacc (137)	Fir chips	52	Several hours	Boiling				Product very poor cellulose (oxycellulose).
1849	Porter (131)	Fir shavings	52		Hot				Product was a white gelatinous mass (oxycellulose).
1850	Mitscherlich (119)	Oak bark and potato skins	32						Suberic and succinic acids were obtained.
1852	Coupier and Mellier (20)	Wood	50	24	60-80	Weak		Boiling	Product used for pulp.
1857	Schulze (145)	Plant materials	27	4-14 days	15				Quantitative cellulose method (0.6-1.8 % $KClO_3$ added to HNO_3).
1861	Barré and Blondel(8,9*,10)	Plant materials (*a*)	52	24	Normal	(*b*)			Water added to HNO_3-raw material mixture and boiled. Pulp used for paper.
1864	Anon. (1)								Method of Barré and Blondel criticized as expensive and dangerous.
1865	Orioli, Fredet, and Matussiere (125)	Wood	Aqua regia	24					Liquid to wood ratio, 0.4:1. Wood pulped completely.
1868	Henneberg (58)	Straws	18	12-14 days	15	2 (*c*)	0.75	60	Modification of Schulze's cellulose method.
1875	Stutzer (153)	Grass	54	12	100				Analytical method for crude fiber.
1880	Bevan and Cross (13)	Jute fiber	5						Converted lignin ("celluloquinone") into soluble products.
1882	Krauch and Becke (102)	Plant materials	27						Crude fiber determination.
1883	Cross and Bevan (22)	Plant materials	60		Boiling				Cellulose → hydrocellulose → oxalic acid.
1884	Young and Pettigrew (169*)	Pine, esparto, etc	20	0.7	Boiling	5 (Basis wood)	0.5	Boiling	Reused nitric acid for pulping.
1885	Haas (47)	Straw and seaweed	42-89	0.5-3.25	Normal				42 % HNO_3 caused spontaneous combustion.
1890	Lifschütz et al. (109*)	Pine chips	21		Normal	0.5		Boiling	Yield 45 %. Acid reused, with increasing temperature to exhaustion.
1891	Lifschütz (108)	Hemp, jute, pine wood, etc	18-46 (*d*)	14-30	20-50	5 (Basis pulp)		Boiling	Reused acid 5 times. First product slightly nitrated. Yield, 38-41 %. Glossy cellulose.
1891	Cross and Bevan (23,24,25)	Jute fiber	5-10		50-60				Yield 60-65 %. Theoretical discussion of process.
1892	Lindsey and Tollens (110)	Fir sawdust	56	6	100				Gelatinous mass, yield 17 %.
1893	Kellner (80*)	Plant materials (*a*)	N-oxides			+			Product defibered mechanically.
1893	Denison and Palmer (27*)	Wood or straw	Nitrates in alkali			5	1-4	60-200# pressure	Approximately 0.75 %$NaNO_3$ present.
1894	Cross (21*)	Hardwood chips	10		80	Weak (*b*)		Boiling	Liquor to wood ratio, 3:1; good pulp; HCN observed.
1895	Baly and Chorley (7)	Beechwood and jute	9.64	4	95-100				Theory of process.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°	
1896	Archbutt (2)	Sawdust	57-67		Normal				Spontaneous combustion.
1896	Suringar and Tollens (159)	Plant materials							Analytical methods for cellulose.
1899	von Faber and Tollens (40)	Cotton	47.5	2.5	Boiling				Obtained 70% yield of oxycellulose.
1902	Zeisel and Stritar (170)	Oak sawdust	Dilute						Analytical method, using HNO_3-$KMnO_4$.
1904	Knecht (88)	Cellulose	70		Cold				70% HNO_3 is lowest concentration for nitration at room temperature.
1904	Donath and Bräunlich (30)	Lignite coal, wood, and peat	6.7		70-100				Investigation of fossil coals.
1907	Schwalbe (146*)	Wood chips	N-oxides	3	Normal	2		Boiling	Used 0.1-1 part N (as oxide) to wood.
1907	Schwalbe (147*)	Wood pulps, ramie, flax, etc	HNO_2	0.5-1.	Normal	Dilute			Purification of pulps.
1908	Hedén (55*)	Wood	N-oxides						Claimed formation of picric and oxalic acids.
1909	Chaptal (19)	Grapevines	Diluted aqua regia		Hot				Thick brownish pulp.
1909	Klein (85)								Review of pulping processes.
1910	Renker (133)	Plant material	10			Weak		Boiling	Liquor to wood ratio, 10:1; 53.6% yield; Cu no. 4.6.
1910	Dmochowski and Tollens (29)	Cotton and cacao shells	18-26	1-1.25	70-80				Analytical method for crude fiber.
1916	Budde (17)	Esparto black liquor							HNO_3 produced orange dye for wool and silk.
1918	Müller (123*)	Wood	HNO_3-H_2SO_4			+			Used waste nitrating acids for pulping.
1919	Wedger (164)	Sawdust	Concd.						Spontaneous combustion.
1920	Badische Anilin und Soda-Fabrik (6*)	Wood chips	N_2O_4						Obtained 50% yield of oxalic acid.
1921	Konig (93)	Lignin, barium lignosulphonate	69						Study of lignin decomposition.
1921	Heuser, Roesch, and Gunkel (59)	Lignin, waste sulphite liquor	Dil. and concd.						Oxalic acid obtained. Catalysts greatly increased yield.
1922	Robinson (135)	Wood	5		Hot or cold				Study of effect of HNO_3 on wooden tanks.
1922	Hirosawa and Kishihara (60*)	Pine leaves	2-3	12	Normal	(*b*, *e*) 0.5-0.8	0.5	30-40 # pressure	Final treatment with 1% Ca $(HSO_3)_2$. for 0.5 hour under pressure.
1922	Krais (94*)	Flax straw, reeds(*a*)	$NaNO_3$-H_2SO_4	3-4	107	1			Pulp defibered mechanically after treatment.
1922	Rindfusz and Voorhees (134*)	Flax tow (*f*) and straw	20 (Basis fiber)	5	Normal	5 (Basis straw)	2	40-50 # pressure	Used 1:1 H_2SO_4-HNO_3 mixture.
1923	Hauser and Bahlman (54)	Woods	5-25		Hot or cold				Hot 5% soln. or cold 25% soln. destroys woods.
1923	Krais (95*)	Wood (*g*)	2.5	4-6	90	1		Cold	Addition to patent (94*) using HNO_3 in place of H_2SO_4.
1923	Krais (96*)	Wood shavings (*g*)	2-5	4	90	Weak		Hot	Used HNO_3, or nitrate $+H_2SO_4$.
1924	Sweeney (160)	Corncobs	Fuming		Hot				Yield, 100% of oxalic acid.
1924	Krais (97*)	Pine wood	7	6-8	95-6	Weak		Hot	Liquor to wood ratio, 8:1, Pulp used for paper.
1925	Krais (98*)	Straw	5	6	90-96				Continuous pulping process.
1925	Krais (99)	Bagasse, straw, reeds, wood	3-5	6-8	95-6	Weak			Review. First to report use of Cr-Ni-steel digestors.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°	
1926	Schorger (144).....	Locust wood.....	N-oxides	.....	.....	.....	.....	.....	Converted into oxalic acid by high voltage in air.
1926	I. G. Farbenindustrie (66*, 70*, 71*).....	Straw or wood....	N-oxides	Several hours	30-40	+	.....	.....	Used air saturated with HNO_3 or N-oxides.
1926	I. G. Farbenindustrie (67*)	Straw or wood (*b*).	10	.....	50	.....	.....	.....	Used air on presteamed, impregnated raw material.
1926	Routala and Sevón (136).	Fir wood.....	35-40 (Basis wood)	.....	.....	.....	.....	.....	Study of pulping process. HNO_3 consumption 30% basis wood.
1926	I. G. Farbenindustrie (Heimann et al.) (68*).....	Straw or wood (*a*) (spruce).....	N-oxides	24	50	+	.....	.....	N-oxides regenerated in raw material.
1927	Krais, Biltz, and Renner (101).....	Straw and reeds....	5-7	.....	.....	.....	.....	.....	Large-scale pulping. Consumption of HNO_3, 60-80% (basis wood). Yields 41-45%; *a*-cellulose 80-86%, Cu no. 2.5-2.7.
1927	Suida and Sadler (155)....	Beech chips (*i*)....	15	1	79	2	.....	Hot	HNO_3 consumption, 30% (basis wood). Yield 40%; *a*-cellulose 85%, Cu no. 2.3-3.1.
1927	I. G. Farbenindustrie (69*)	Straw and wood (*i*).	12-20	.....	20-60	.....	.....	.....	Desirable cellulose produced.
1927	Suida and Sadler (154*)...	Beechwood.....	15-25	.....	85	9	1	.....	Acid may contain H_2SO_4. NaOH reused repeatedly.
1929	I. G. Farbenindustrie (72*)	Beechwood chips...	50	1	30	.....	.....	.....	Yield 47%; *a*-cellulose 84%; N_2O_4 vapors reused; Nitrogen loss 1% (basis wood).
1929	Suida, Sadler, and Noss (156, 157).....	Rye straw.....	1.4-10.8	0.5-3	58-89	1.7	0.5	Hot	Study of 105 runs. Yields 40-60%. HNO_3 consumption 5-25% basis pulp.
1929	I. G. Farbenindustrie, Heimann et al. (56*, 73*)..	Spruce, etc.....	10	.....	70-80	.....	.....	.....	Treatment repeated if necessary. Wood steeped in acid, then heated with water or dilute acid.
1929	Klein (86).....	Wood.....	.....	.....	.....	.....	.....	.....	Review of pulping processes.
1929	Schaarschmidt, (141) Nowak and Zetzsche.....	Cellulose and lignin	N-oxides	.....	.....	.....	.....	.....	Obtained 60% dihydroxybutyric acid on basis of converted cellulose.
1929	Schaarschmidt and Nowak (139).....	Beechwood meal...	7	.....	.....	.....	.....	.....	Yield 47.8% cellulose. Required 25.9% HNO_3, basis dry wood. HNO_3 consumption 12%, basis dry wood, or 25%, basis pulp.
1929	Kürschner and Hoffer (105)	Plant materials....	14 in alcohol	1	Boiling	.....	.....	.....	Quantitative method for cellulose. Treatment repeated 2-4 times.
1930	du Boistesselin (14*).....	Straw.....	6.3	3	80-85	5 (*b*)	0.5	Boiling	Yield 37.2%, ratio liquor to wood 9:1. Reused acid 10 times.
1930	I. G. Farbenindustrie (Heimann et al.) (57*, 74*).	Resinous (pine) wood (*j*).....	30	.....	60-80	Dilute	.....	Hot	Material steeped in acid, then heated in water or dilute acid. After-treatment with cold 8% NaOH produced pulp low in resins.
1930	Basler (11*).....	Grasses, etc.....	Diluted aqua regia (*k*)	0.5-2	90	+	.....	.....	Liquid to solid ratio, 7-17:1. Product contained *a*-cellulose.
1930	Suida, Sadler, and Noss (158).....	Cornstalks.....	4-5	1.5	80	+	.....	.....	Yield 42%; *a*-cellulose 83.8%, Sieber no. 38.9, Cu no. 1.17, ash 6.0%. Acid consumption 25-51%.
1930	Kürschner (103).....	Plant materials....	14 in alcohol	.....	Boiling	.....	.....	.....	Both alcoholic and aqueous HNO_3 formed nitrocompounds.
1930	Kürschner and Hanak(104)	Cacao.....	8 in acetic acid	0.25-0.5	Boiling	.....	.....	.....	Crude fiber method.
1930	Freudenberg et al. (43, 44)	Lignin.....	N_2O_4	.....	.....	.....	.....	.....	Lignin nitrated, splitting off HNO_2. Product contained one N for each $-OCH_3$ present.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°	
1931	Horváth and Éber (65)	Cornstalks (*l*)	2-3	1.3-2	70-98	1-1.5	1.7	15-45 # pressure	Ratio, liquid to solid, 8:1. Yield 45-47 % easy-bleaching pulp.
1931	Scharrer and Kürschner (142)	Animal feed	5 cc. HNO_3 75 cc. AcOH 2 cc. CCl_3COOH	0.5	Boiling				Quantitative method for crude fiber.
1931	Krais (100)	Bamboo	5-7	6-8	90-95	+			Yield 30 % high grade pulp.
1931	Darling (26*)	Straw	2	1	Boiling	1 (*m*)		10-30 # pressure	Over 90 % α-cellulose.
1931	Lewis and Laughlin (107)	Rag stocks and wood pulps							Comparison of Kürschner-Hoffer and other analytical methods.
1932	Schaarschmidt and Nowak (140)	Beechwood chips	7-10	1-3	100	1-2			Yields 46-48 %. Extensive investigation including effect of acid on each constituent.
1932	Lynch and Goss (113)	Bagasse (*n*)	5	1	80	2	0.5-0.75	Boiling	Yield unbleached pulp 42-46 %, bleached pulp 38-40 %; α-cellulose 86.1-93.5 %.
1933	Bassett (12*)	Linters, kraft pulp and screenings	0.05-5	1-3	20-100	8-10	1	Boiling	Acid does less tendering after first use. Ordinarily no acid consumed.
1933	Korzheniovskiĭ and Raskina (90*, 92)	Cottonseed husks, etc	Weak		Hot	+			The nitric acid pulp is of better quality than the soda, sulphite or sulphate pulps.
1933	Klingstedt (87)	Wood cellulose	Concd.						Concentrated HNO_3 effected separation of pentosans from sulphate cellulose.
1933	Malowan (116)	Bagasse							Very good pulp; α-cellulose 93 %, Cu no. <2.5, ash <0.4, soda-solubles <12 %.
1933	Mayer et al. (117*)	Beechwood chips	52	8	60-65				Produced 50 % oxalic acid, basis wood, and water-soluble polysaccharides.
1934	Webber (162)	Corncobs	50-95		Warm				High yields of oxalic acid.
1934	Lynch (112)	Bagasse							Report on pilot plant work.
1934	Mitterbiller-Epp (120*, 121*)	Wood, etc	0.2-2	0.3	120-130				Used HNO_3 in 30 % glycerol or concentrated beet-sugar solutions.
1934	Kipper (81*)	Wood and cottonseed hulls	60 in CCl_4	0.7	Boiling	+		Boiling	Used HNO_3, or N-oxides + oxygen.
1934	Kipper (82*)	Wood and cottonseed hulls (*o*)	5-15 N-oxides	0.5-6	Normal	0.25-2		Hot	Material mechanically beaten during digestion.
1934	Payne (127)	Bagasse (*p*)	1.5-5	1	80-100	2	0.75	Boiling	Optimum concentration, 2 % HNO_3; yield of pulp 38 %.
1934	Korzheniovskiĭ (91)	Cotton fiber	3.3	Varied	Varied				Study of effect of acid on cotton fiber at various temperatures.
1934	Arroyo (5)	Bagasse							Confirmed results of Lynch and Goss (113).
1934	Sarkar (138)	Jute lignin	1.6-100	2-96	20-100				Effect of HNO_3 on jute lignin at diff. temps.
1935	Kipper (83*)	Wood and cottonseed hulls (*r*)	5-15 N-oxides	2-3	Hot	10-20(*s*) (Basis wood)	2	50 # pressure	Also used HNO_3 solution. Material beaten during digestion.
1935	I. G. Farbenindustrie (76*)	Wood shavings	4	8	60-90	3			Acid circulated; pressure rose to several atmospheres.
1935	Kipper (84*)	Wood and cottonseed hulls	60 in benzene		Hot or cold			Hot	Liquor to solid ratio, 3:1. Used mixture of benzene + HNO_3 (20 % HNO_3, basis wood).
1935	Foster (42*)	Bagasse (*t*)	2	2-4	71	5	3-6	49	Bleach consumption 0.2 that of usual pulps.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°	
1935	Dreyfus (31*).....	Poplar sulphite pulp	6	3	80	3	1.5	21 # pressure	Liquor to solid ratio, 4:1. Used special "used" acid.
1935	Dreyfus (32*).....	Wood chips.....	5-10	3-7	60-95	2.5	3	Boiling	Liquor to wood ratio, 5-10:1. Lower concentrations used at the higher temperatures.
1935	Dreyfus (33*).....	Pine chips (*t*).....	7	8	80	3	1	Boiling	Alkaline treatment preferably under pressure.
1935	Brit. Celanese Ltd. and Miles (16*, 118*).....	Plant materials....	0.5-10	.....	95-100	+	.....	.....	Removed SiO_2 with H_2F_2.
1935	Shikata and Akagi (148)..	Cotton stalks.....	7.2	.....	100	5	.....	Boiling	Ash 5.27%, Cu no. 0.48.
1935	Solechnik (152).....	Aspen chips.....	3-7	1.5-8	98	0.5-0.25	2	35-40	Yield 46.5-54%; ash 0.07-0.13%. HNO_3 consumption 45%.
1935	Hachihama, Ônishi, and Takemura (50, 53).....	Bagasse.....	1-6	0.5-2.5	80-100	0.5-3	0.5-4	80-120	Pulping study of conditions. Pulp had lower viscosity than soda, sulphate or sulphite bagasse pulp. Lignin is dissolved as nitrolignin, and pentosans are hydrolized.
1935	Macormac (114).....	Whole cotton plants	3	1	95	.....	.....	.....	HNO_3 gives promising results.
1935	Munds (124).....	Beechwood.....	.....	.....	.....	.....	.....	.....	Review of pulping processes.
1935	Kantorowicz (79*).....	Crude cellulose....	1.35 in HCHO	.....	120	.....	.....	.....	Used for paper towelling and "artificial wood".
1935	I. G. Farbenindustrie (75*)	Wood, etc.....	+	.....	.....	.....	.....	.....	Obtained oxalic acid and dextrins.
1935	Hachihama and Fujita (48)	Sucrose and starch..	30-35	15-20	85	.....	.....	.....	Obtained saccharic and oxalic acids.
1936	Wedekind (163).....	Beechwood.....	+	.....	.....	.....	.....	.....	Modified HNO_3 process, α-cellulose 91%, lignin 0.37%, ash 0.2%, Cu no. 0.4-0.58, Gibson viscosity 19.
1936	Hachihama, Ônishi, and Takemura (51).....	Bagasse.....	3	2	95	4	1	95	Liquor to solid ratio, 10:1. Consumption of acid 18.7-19.4%, basis bagasse. 88-89% α-cellulose, 7-9% pentosans, 1% ash, Cu no. 1.0.
1936	Shimoda (149).....	Scotch pine.....	N_2O_4 (*u*)	1.5-4	60-97	0.2-0.5	.....	.....	Pulp yield 38-50.8%; α-cellulose 81-92%; survey of conditions.
1936	Shimoda (150, 151).....	Rice straw.....	1-4	1	70-100	0.5-1	.....	100	2% HNO_3 for ordinary pulp, 4% for chemical pulp. Analyzed evolved gases.
1936	I. G. Farbenindustrie (77*)	Beech and quebracho wood chips (*v*)..	10-12	1-20	20-70	+	.....	.....	Liquor to wood ratio, 10:1. Yield purified pulp 25-32%. Use of catalysts resulted in large yields of oxalic acid.
1936	Dreyfus (34*).....	Spruce or poplar chips or poplar sulphite pulp....	5-10	4-6	50-90	2.5-3	1.5-3	100-120	Acid and alkaline digestions carried out under pressure.
1936	Hoche (61*, 62*, 63*)....	Wood, sisal, hemp, bagasse.....	1-77	1-2	20-70	.....	.....	.....	Obtained high oxycellulose product. Added small amount of sugar to acid.
1936	Wisconsin Alumni Research Foundation(167*)	Starchy materials...	1 in alcohol	.....	Boiling	.....	.....	.....	Starch purification.
1936	Hachihama and Ônishi (48).....	Bagasse, etc.....	3	2	95	.....	.....	.....	Nitro-compounds isolated from used nitric acid.
1937	Macormac and Cameron (18, 115).....	Whole cotton plant (*w*).....	2.1	1	85-90	1 (*m*)	3	85-90	Pulp yield 41%; α-cellulose 87-90%, ash 6.3%.
1937	Aronovsky and Gortner(3)	Aspen and jack pine chips and sawdust	1-6	2-7	80-100	2-4	1-6	100	Acid digestion carried out in water and alcohol. Yields higher in alcohol due to less hydrolysis of carbohydrates.
1937	I. G. Farbenindustrie (78*)	Plant material (*x*)..	2-7	8	70-90	3.2	2	80	Liquor to solid ratio, 2.84:1; under pressure of 5 atmospheres. Consumption 91% of HNO_3 added.

Date	Investigators	Raw Material	Nitric Acid Treatment			Alkali Treatment			Remarks
			Per cent Acid concn.	Time in Hours	Temp. C°	Per cent Caustic concn.	Time in Hours	Temp. C°.	
1937	Kürschner and Schindler (106)	Decayed fir wood...	14 in alcohol	.....	.....	.....	.....	.....	For each COOH group, fir humin contained two NO_2 groups and spruce nitro-lignin contained one NO_2 group.
1937	Hachihama and Takemura (52)	Rice straw, wheat straw, bamboo...	3-65	2-5	95	.....	.....	.....	Picric acid and other nitrophenols formed.
1937	Payne, Fukanaga, and Kojima (128)	Bagasse (*y*).....	1.42	1	98-100	1	.....	Boiling	Yield of nitrated lignin 12%. N content, 1.77%.
1937	Reid and Lynch (132)....	Plant materials....	.....	.....	.....	.....	.....	.....	Comparison of Kürschner-Hoffer with other cellulose methods.
1937	van der Werth (165).....	.....	.....	.....	.....	.....	.....	.....	Patent literature review on production of straw pulp.
1937	Dreyfus (34A*).....	Wood, straw, grass (*aa*).....	1 in Acetic acid	3	95	3.4	.....	Boiling	Acid treatment carried out in the presence of lower aliphatic acids.
1937	Knight (89).....	Bagasse, etc.....	.....	.....	.....	.....	.....	.....	Report on practicability of HNO_3 as a pulping agent.
1938	Dreyfus (37*).....	Wood, straw, (*g*) grass, etc.....	HNO_2	.....	.....	Dilute	.....	.....	Cellulose obtained by simultaneous treatment with nitrite and fatty acid.
1938	Feldtmann (41).....	Beechwood.....	.....	.....	.....	.....	.....	.....	Discussion of commercial production of HNO_3 pulp. A 40-ton mill in Germany is discussed.
1938	Dreyfus (35*, 36*).....	Wood (*t*).....	2-10	1-10	50-95	1.5-3.5	3	100-130	Liquor to wood ratio, 10:1. Acid concentration reduced as temperature is increased.
1938	Eckert and Plaeschke (38).	Flax shives (*z*).....	6	1.5	97-8	2	1	Hot	Yield 27%; 97% α-cellulose, 0.5% ash, Cu no. 0.63, HNO_3 consumption, 17.7% (basis shives).
1938	Aronovsky and Lynch (4).	Bagasse.....	1-6	3-6	80-100	2	1	Boiling	Compared alcohol and water solutions of acid. Yields 47-60% in alc., 31-44% in water. Complete analysis of pulps.
1938	Whittemore, Reid and Lynch (166).....	Bagasse (*g*).....	2.1	2	95	2	1	Boiling	Pulp yield 50%. HNO_3 consumption 15.5% basis pulp. Conductometric analysis of used liquor is described.
1938	Jayme and Schorning(78A)	Beechwood.....	3.5	1.5	80	2 (*q*)	1	50	Quantitative method using 17.5% NaOH after-treatment to obtain purified pulp.
1938	Seiberlich (147A).....	Wood.....	.....	.....	.....	.....	.....	.....	Brief review of hydrolysis and oxidation products formed.

EXPLANATORY NOTES

(*a.*) Moistened before treatment.
(*b.*) Sodium carbonate used for digestion.
(*c.*) Ammonium hydroxide used for digestion.
(*d.*) Also contained 0.25 volume of H_2SO_4.
(*e.*) Calcium hydroxide used for digestion.
(*f.*) Calcium hydroxide, 20% at 50 pounds pressure for 3 hours.
(*g.*) Pretreatment with dilute alkali.
(*h.*) Steamed and steeped in acid.
(*i.*) Steeped in acid.
(*j.*) Impregnated with HNO_3 under vacuum at 30 to 50° C. Acid is then drained off.
(*k.*) One part concentrated HCl, 3 parts concentrated HNO_3, 8 to 15 parts water.
(*l.*) Stalks chipped, beaten to a pulp and dried.
(*m.*) Sodium hydroxide plus 0.1% sodium sulphite used.
(*n.*) Steeped in 5% HNO_3 for 3 hours. 70% drained off before heating.
(*o.*) Steamed and beaten one-half hour.
(*p.*) Steeped 3 hours in cold acid.
(*q.*) Sodium hydroxide plus 2% sodium sulphite.
(*r.*) Steamed to 20% moisture. Treated 2 to 3 hours with 5 to 15% N-oxides with addition of air.
(*s.*) Treated with 0.5% NaOH 1 to 3 hours at 72° C.
(*t.*) Boiled or steamed under pressure. 128° for one hour at 25 pounds pressure.
(*u.*) 0.1049-0.1994 gram N_2O_4 supplied per minute.
(*v.*) Steeped in 12% HNO_3 for 12 hours.
(*w.*) Wax and oil extracted by C_6H_6 or CCl_4; stalks then wet with hot water.
(*x.*) HNO_3 applied at 40 to 60° C. under vacuum.
(*y.*) Extracted with benzene-alcohol (2:1).
(*z.*) Wax dusted out and flax washed.
(*aa.*) Pretreatment with steam, alkali, or sulphite liquor.

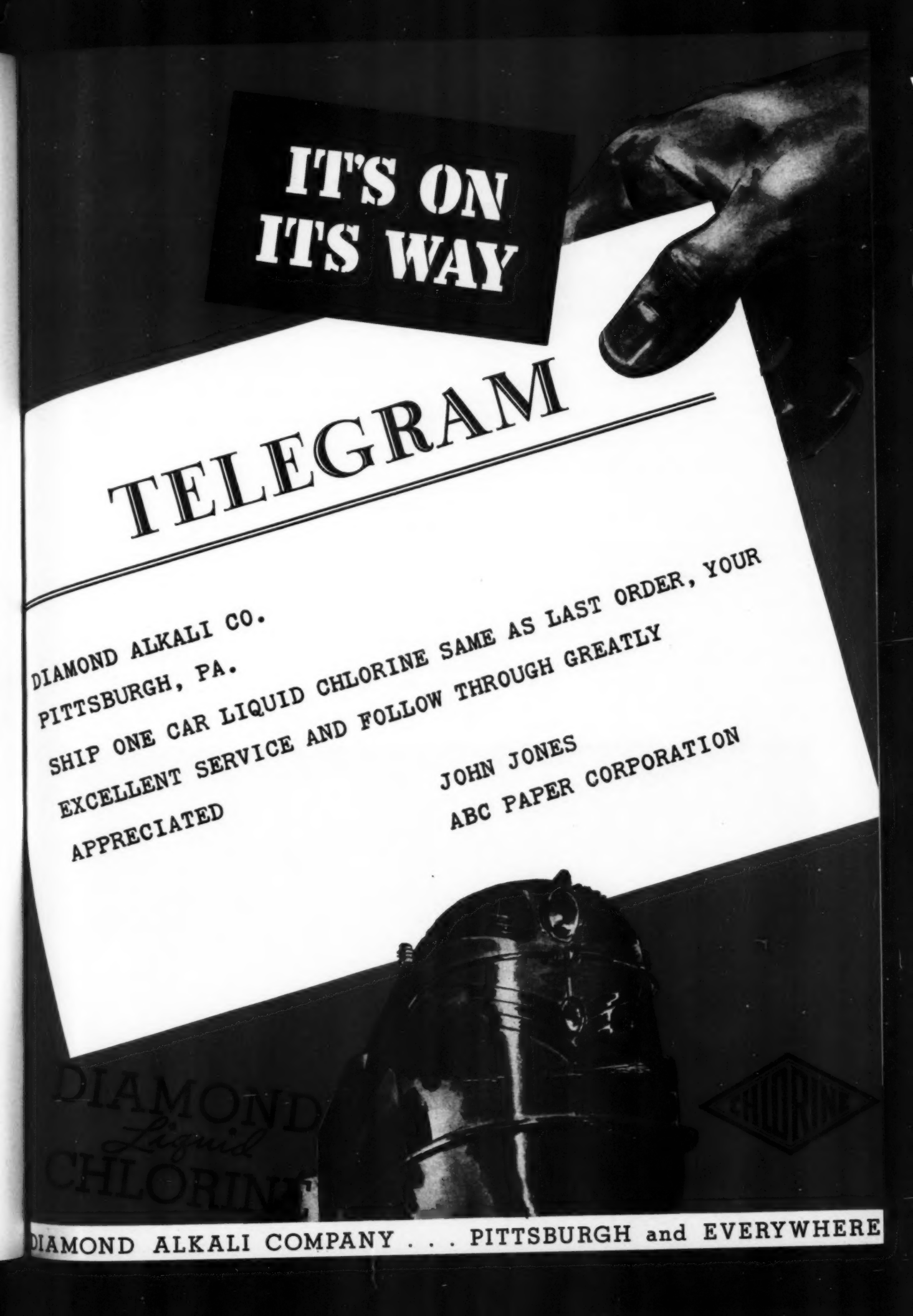
(Continued from page 336)

is attested by the large number of articles published and patents issued in the last 20 years. The pilot-plant production of nitric acid pulp from sugar cane bagasse and the commercial-scale production from beechwood have resulted from many years of research and development. The present trend toward constantly increasing use of cellulosic products throughout the world, and the increased amount of research on the utilization of the waste annual fibrous materials should provide a great impetus for increased commercial adoption of the nitric acid pulping process; and the indications are that this process will soon be considered as one of the standard commercial methods for obtaining cellulose from fibrous plant materials.

A chronological outline of the work carried out on the nitric acid process to date is given in Table 9 (See Page 338). Only the data pertinent to this process have been included in this table, thus giving a complete summarized picture of the evolution of pulping with nitric acid. In those cases where closely related work was carried out by the same investigators over a period of years only the earliest date is recorded although all of the references are cited.

PAPER SKETCHES

THE ORIGINAL CYLINDER USED ON AMERICA'S FIRST PAPER-MAKING MACHINE, SET UP ON THE BRANDYWINE NEAR WILMINGTON, DELAWARE, BY THOMAS GILPIN ABOUT 1817, APPEARS TO HAVE BEEN A JOHN DICKINSON CYLINDER BROUGHT TO GILPIN IN AMERICA BY A TRUSTED EMPLOYEE OF DICKINSON'S IN ENGLAND.
IT WAS NOT UNTIL SIXTEEN YEARS AFTER ITS INVENTION IN FRANCE THAT THE PAPER-MAKING MACHINE WAS INTRODUCED IN THAT COUNTRY. THIS MACHINE WAS A CRUDE AFFAIR MADE BY M. CALLA OF PARIS IN 1815.
AS LATE AS 1832 BRITISH PAPER-MACHINE BUILDERS IN CONSTRUCTING THEIR EQUIPMENT TOOK GREAT PAINS TO MAKE SURE NO IRON COULD COME INTO CONTACT WITH WET PAPER, BELIEVING, AS THEY DID, THAT THE RUST SPOTS SO COMMON TO PAPER OF THE PERIOD WERE CAUSED BY CONTACT WITH THE METAL.
1926
1678,000
1938
820,000
ANNUAL NEWSPRINT PRODUCTION IN THE UNITED STATES DECLINED FROM A PEAK OF 1,678,000 TONS IN 1926 TO 820,000 TONS IN 1938—A DROP OF APPROXIMATELY 50% OVER THE 12-YEAR PERIOD


IT'S ON
ITS WAY
TELEGRAM
DIAMOND ALKALI CO.
PITTSBURGH, PA.
SHIP ONE CAR LIQUID CHLORINE SAME AS LAST ORDER, YOUR
EXCELLENT SERVICE AND FOLLOW THROUGH GREATLY
APPRECIATED
JOHN JONES
ABC PAPER CORPORATION
DIAMOND
Liquid
CHLORINE
CHLORINE
DIAMOND ALKALI COMPANY . . . PITTSBURGH and EVERYWHERE

ASSOCIATIONS

Old Timers Meet with Michigan Supers

MEN whose progressive spirit, long years of experience, and goodfellowship have contributed much to the advancement of pulp and paper making in America, assembled in a meeting of "Old Timers" in Kalamazoo, Michigan, on Thursday evening, May 18. It was a specially designed program of the regular monthly meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association.

William C. Nash, president of Gilbert and Nash Company, Menasha, Wisconsin, whose papermaking career started more than sixty years ago, drove 250 miles on the day of the meeting with his son, William M. Nash. Following the meeting, he was asked if he were tired enough to go to bed and rest, to which he replied, "I always get tired when I rest."

There were more than eighty men present, of which twenty-four were in the circle of "old timers."

▸▸▸ Raymond L. Barton, chairman of the Michigan Division, opened the program, following a delicious steak dinner, with a review of the history of the Michigan Division. This was the first division to be organized, which is recorded as July 10 and 11, 1919. Mr. Barton gave a glowing tribute to the "old timers," introducing each of them, to which they responded with interesting reminiscences of their early experiences.

Fred C. Boyce, president of the D. J. Murray Manufacturing Company, Wausau, Wisconsin, who was president of the Superintendents Association during its first two years, reviewed its early history. Fifty-five years of service in the papermaking industry behind him, Mr. Boyce now enjoys the good things which an active retirement offers him. He is prominent in a society known as the Ancient Order of Chinese Paper Makers.

A paper entitled "Old Timers" was prepared by William C. Nash and read by his son, Morgan, who said that he was born in the industry and is still in it. Mr. Nash referred to his topic as a term of broader significance than its relation to men, only. The "old timers" to which he referred specially were the equipment and paper machines used in the days of his apprenticeship. "Things that look as ridiculous in the methods and means that we employ to make paper today," he said, "will have, in the matter of contrast, a similar comparison thirty years hence."

E. H. (Dad) Gilman, who has retired after sixty-two years of service in the industry, but still makes daily visits to the Watervliet Paper Company, of which he was superintendent for a number of years, related his early experiences which began in a soda pulp mill in Quebec.

Robert B. Stewart, of the Kalamazoo Vegetable Parchment Company, was introduced as the dean of active paper mill superintendents in the Michigan Division. Mr. Stewart recalled when the machine tender was electrician and millwright, as well as papermaker.

Bernard (Barney) Benson, of Williams-Gray Company, Chicago, recalled his variety of experiences in

When Old Timers Get Together

Seated at the table, left to right—Otto Fisher, Robert Stewart, C. B. Smith, E. T. A. Coughlin, W. J. Lawrence, E. H. Gilman, Pete Denner, Everett Hays, Fred Scheid, and Chas. B. Hays. Standing, left to right—Barny Benson, Fred Boyce, Art McPhillips, Roy Zellers, Wm. Nash, Howard Teter, Homer Stafford, Wm. Redmond, Bert J. Cole, Mathew Ketter, Jacob Parent, George Rice, Arthur Cole, and Alfred E. Bryant.

$70 + $1440 + $191 = $1701 saved on just 3 Machines

A PROMINENT PAPER MANUFACTURER found that blown fuses and motor burnouts were causing production to drag—and costing too much loss in man-hours, machine time and maintenance expense. By replacing fuses with Westinghouse Nofuze protection, on just three machines, they saved a total of $1701 a year . . . and here's the way they did it:

$70 HERE

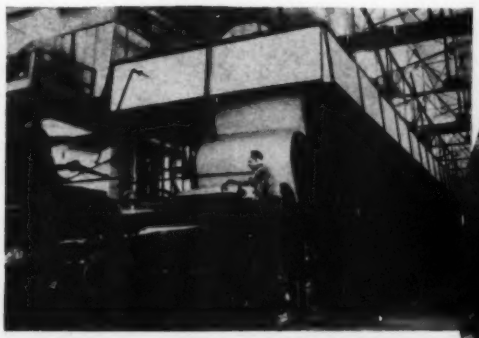
Every day, 3 or 4 fuses blew, 15 minutes lost each time, for 3 operators and 3 machines. Cost of lost man-hours alone — $1.35 per day — $70 per year, plus idle machine time. One ABI Breaker reduced it to estimated five minutes loss per day, with no maintenance.

$1,440 HERE

Any one of six motors burning out on this paper machine caused loss of $125 per hour machine time, plus $100 motor repair. Four times a year — the usual record — cost $1,440. All saved with Nofuze Breakers — not a motor burnout in 2½ years.

$191 HERE

The vertical pump motor used to circulate material through the sump frequently stalled due to overload. Workmen blocked the fuses, tried to force impeller with large wrench. Frequent result — burnt-out motor. Even at once a year, this cost $191 for repairs. But a Westinghouse Nofuze Combination Linestarter stopped the trouble and cost — permanently.



J-94066

Perhaps you could make similar savings, speed up operations, improve products, with modern electric drives. Westinghouse will help you check your plant. Just call the local office, or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Address Dept. 7-N.

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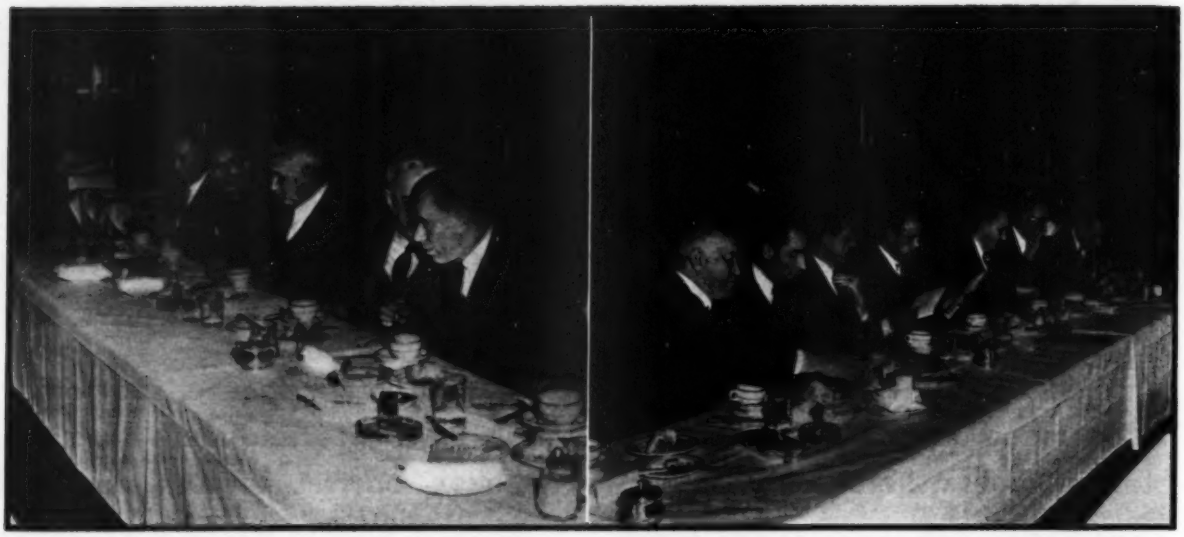
ELECTRICAL PARTNER OF THE PAPER INDUSTRY



Left to right—(across the page) At the speakers' table at the Old Timers dinner meeting were: Wm. C. Nash, John Cornell, Fred Boyce, Robert Eminger, Roy Zellers, Homer Stafford, Ray Barton, Norman I. Bearce, O. W. Callighan, L. H. La Liberte, Arnold Weller, and A. B. Perlick.

mills all over the country and eventually becoming a salesman, which permitted him to satisfy his desire to travel.

Charles B. Hays, vice president of Watervliet Paper Company, reviewed the history of paper mills in the Kalamazoo Valley of which he was instrumental in organizing. He concluded with a splendid tribute to Dad Gilman.

W. J. Lawrence, president of the Bryant Paper Company, Kalamazoo, congratulated the Michigan Division and the "old timers" with words of praise.

E. T. A. Coughlin of Pettengill, Incorporated, Chicago, reviewed the formation of the Michigan Division, of which he was the first chairman.

Howard E. Teter, mill manager of the Mead Corporation, Chillicothe, Ohio, announced that he was thrilled at coming to the meeting until he discovered that after his thirty-five years in the industry, he was an "infant" in the company of men who had served longer. He got something out of it anyway, he said, for he was going home feeling young again.

Other "old timers" who spoke were: William J. Redmond, P. L. Denner, and J. A. Wise, of the Kalamazoo Paper Company; George H. Rice of Kalamazoo Vegetable Parchment Company; Otto Fischer of Bryant Paper Company; Alfred Bryant, retired; Fred Scheid of Watervliet Paper Company; Everett Hays of the Michigan Paper Company; Arthur W. Cole, Rex Paper Company; C. B. Smith, Huron Milling Company; M. J. Ketter, Hoberg Paper Mills, Green Bay, Wisconsin; Bert Cole, the Mead Corporation; Jacob Parent, Noble and Wood Machine Company; Art McPhillips, Simonds Worden White Company; and Frank Whittiger of the Ciba Company.

Robert L. Eminger, secretary-treasurer of the National Association, outlined the program of the 20th Annual Convention, which will be held in Washington, D. C., June 13 to 15. All were warmly urged to attend what is expected to be the largest and best convention of the Association that has yet been held.

▶▶▶ The high spot of the meeting was the presentation of a life membership in the Michigan Division of the Superintendents Association to Homer E. Stafford, retired, of Kalamazoo. The presentation was eloquently made by F. L. Zellers of the French Paper Company, Niles, Michigan, national president of the Superintendents Association, who likened Mr. Stafford to the bridge builder who bridges the chasm to make it easier for others to pass.

Homer Stafford was born June 19, 1874, in Montaque, Lewis County, New York. He started to work in a paper mill as a cutter boy at the age of thirteen, and in six years he was promoted to machine tender. During the period 1896 to 1925, he worked for Knowlton Brothers Paper Company, Watertown, New York, rising from machine tender to superintendent. In 1925, he came to the Hawthorne Paper Company, Kalamazoo, as superintendent, where he remained until 1938, when he resigned.

Mr. Stafford has been a member of the Superintendents Association since the year it was organized, and was chairman of the Northern New York Division three times. He rose to the office of first vice president of the National Association, but due to illness and his new duties at Hawthorne, he was unable to assume the duties of president of the Association. His keen interest in association affairs is recorded in his regular attendance at divisional meetings and the annual conventions, where he is active in giving and receiving information.

A presentaton of a life subscription to *The Paper Mill and Wood Pulp News,* the association's official organ, by John Cornell was given Mr. Stafford in the form of a framed certificate.

O. W. Callighan, of Edgar Brothers Company, read telegrams and letters from people unable to attend.

Accompanying Chairman Barton at the speakers' table were the officers of the Michigan Division consisting of L. H. La Liberte, K.V.P., first vice chairman; A. J. Weller, Sutherland Paper Company, second vice chairman; and A. B. Perlick, K.V.P., secretary-treasurer.

The meeting adjourned following the presentation of a paper on the subject "Complaints," delivered by Norman I. Bearce, technical director of the Champion-International Company of Lawrence, Massachusetts.

◆

▶▶▶ TWO GRACEFUL TRIBUTES paid by the Northeastern Division of the American Pulp and Paper Mill Superintendents Association was the conferring of life membership on Nelson R. Davis, formerly of the S. D. Warren Company, and Arthur B. Larcher of the Penobscot Chemical Fibre Company, Old Town, Maine.

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COMPANY

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ORANGE
NEW JERSEY

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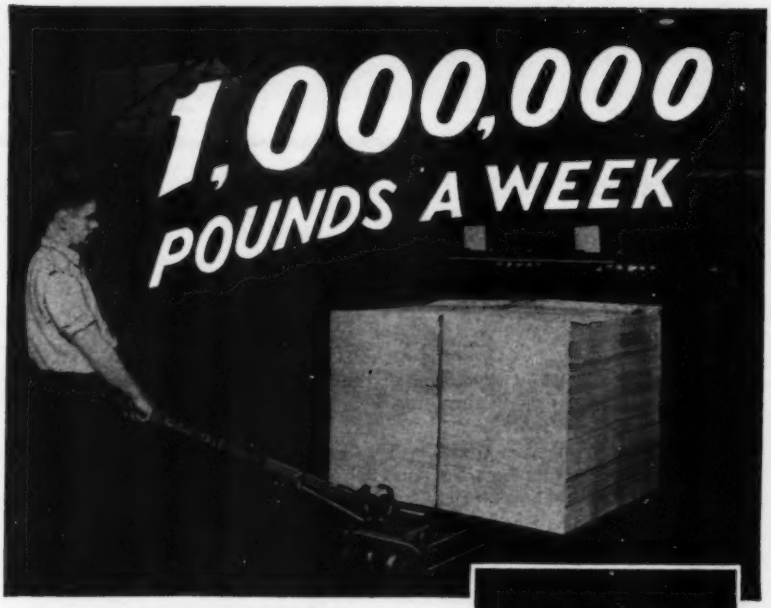

HANDLED BY
YALE HAND LIFT TRUCKS

Taking into consideration the various movings, there are over 1,000,000 lbs. of quality paper being handled every week at the Dalton, Massachusetts, plant of the Byron Weston Company, leaders in ledger paper. This is a real handling problem that brooks no inefficiency. The slightest laxity, and production would be slowed up all along the line—resulting in higher costs at the expense of profits.

So naturally Byron Weston use the most efficient system of materials handling that they could possibly find—a fleet of Yale Blue Streaks working in conjunction with Yale Skid Platforms. These trucks and platforms are in constant service under capacity loads—yet never have they given any trouble. A typical Yale record!

And here's what the Byron Weston Company have to say about their equipment:

"On the job every day in the year, our Yale and Towne Blue Streaks have proven their safety and efficiency to our entire satisfaction. But above all, one thing stands out—THEIR AMAZING ECONOMY."

"*But above all, one thing stands out—THEIR AMAZING ECONOMY.*" That's a statement which reflects Yale service to a "T." Easier to operate—Cheaper to maintain . . . Yale Hand Lift Trucks have proven by actual on-the-job service their uncanny ability to cut handling costs to the very bone. No wonder plants which use them are so enthusiastic!

Make the predominant choice of modern industry your choice. Switch to Yale—and SAVE!

Trained sales engineers are located in 56 major industrial centers ready for instant service. Consult your classified directory.

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SAFETY

SAFETY DAY HELD AT K-C MILLS

As a part of its safety work, the Kimberly-Clark Corporation celebrates each year what is known as annual safety day. A great deal of expense and planning is put into the exhibits that are a part of these events.

On May 19 and 20 the Niagara mill of the company devoted its interests to the promotion of safety. Through the co-operation of the Niagara School Board, the High School Gymnasium was used for the event, as the success of the first annual safety day last year, made it necessary to secure a larger hall in which to stage this annual celebration.

The booths this year were very unique and attractive and were voted much better even than those shown last year. Each department of the mill had prepared a special booth, each of which brought out a strong lesson in safe rules and practices. In addition to the industrial booths, there were local groups which presented civic booths, backed by the Niagara Schools, and Women's Club. The services of the Wisconsin driving testing device had been secured by the Village of Niagara and the Niagara Safety Council. This proved most interesting and many of those present submitted to the test. The safety colors, green and white, were used in the color scheme and two large National Safety emblems formed the background of the stage.

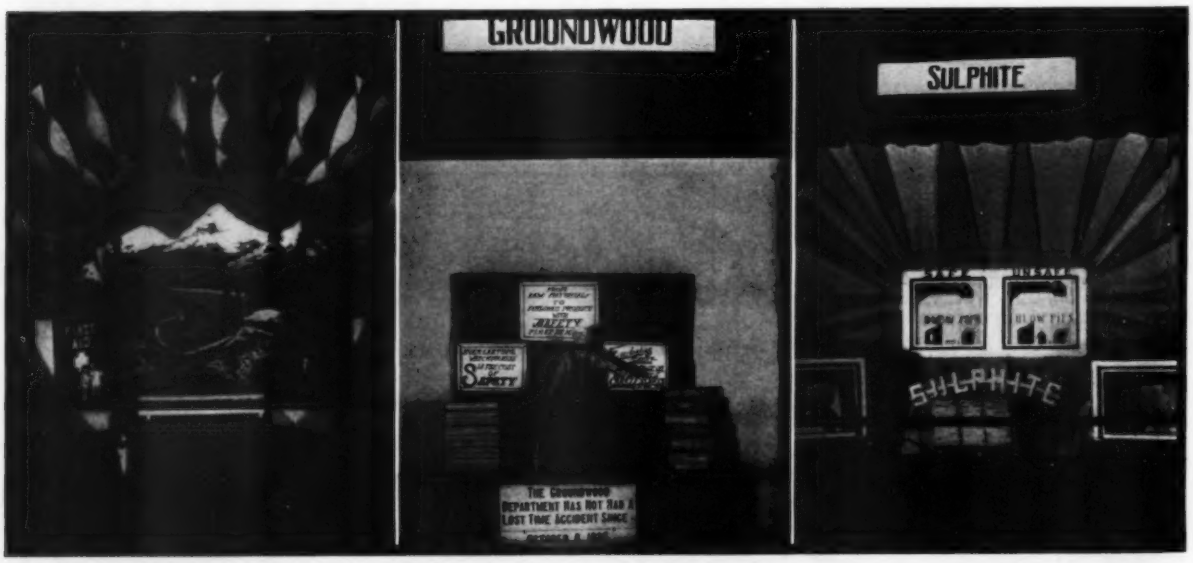
The two days were filled with educational features and interesting events and was considered a valuable adjunct to the safety work being done at the company's mills. The company will sponsor a second annual safety day program on June 14 in Lakeview Mill Park, Neenah, Wisconsin. Mills of the concern which are co-operating are Kimlark, Atlas, Kimflex, Badger Globe, and Lakeview. Each department of the mills will have a safety booth containing some safety project. Officials of the corporation will be presented and several nationally known speakers will be on the afternoon program which also will feature the presentation of awards and addresses by superintendents. All Kimberly-Clark employees and guests are invited.

MERSEY CO. CAMPAIGNS FOR SAFETY

A sustained campaign against accidents is being waged at the Mersey Paper Company, Liverpool, Nova Scotia.

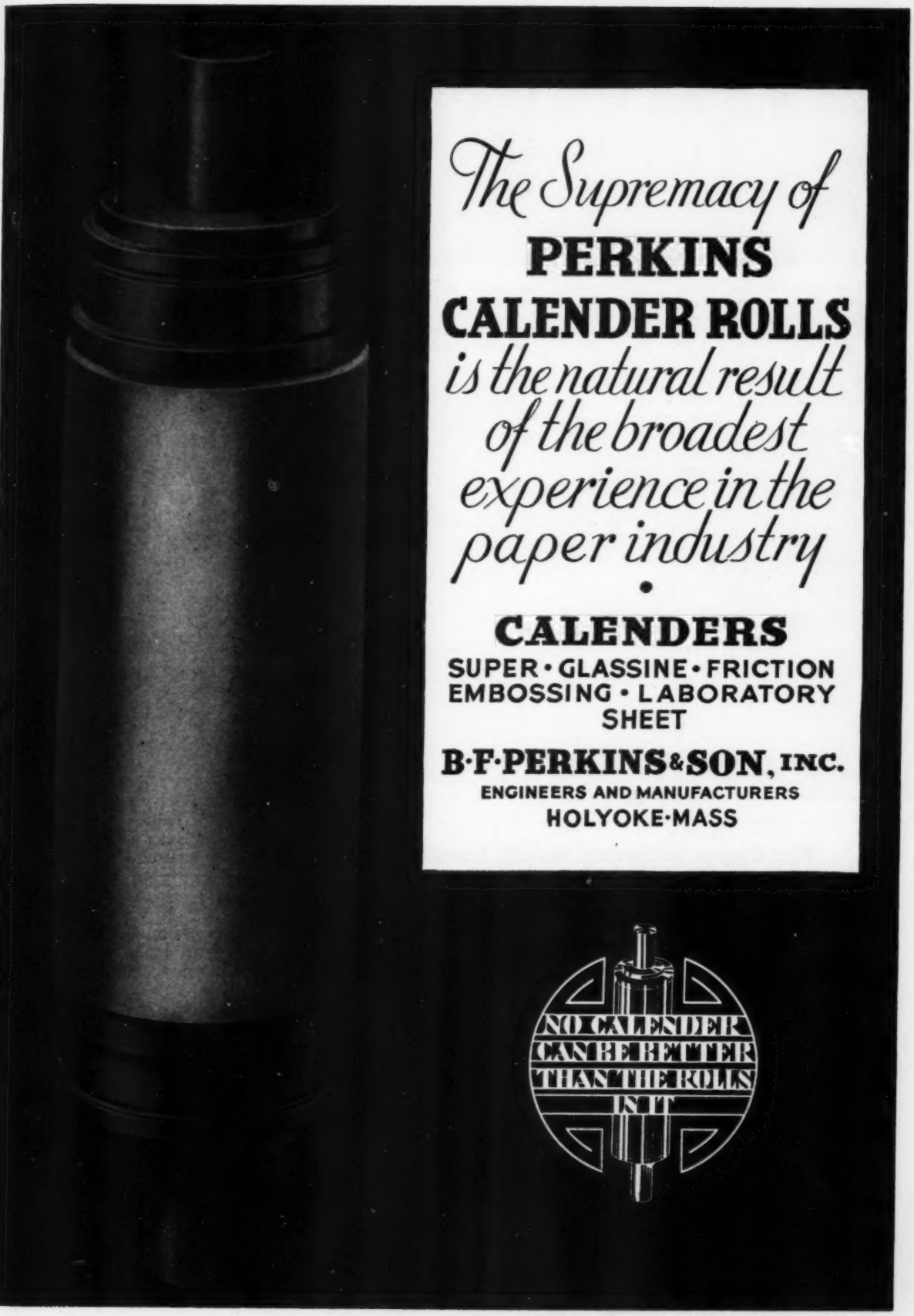
As a part of the safety campaign, a huge signboard, black with white lettering, has been installed prominently in the company mill yard. On the board is the slogan "Mersey Paper Company Permanent Safety System," under which is the standing of the company in the safety drive. There are also spaces for a popularity contest, a monthly feature by which four names of employees are drawn each month, 12 eventually being voted on at the end of a year and one getting the honor of going to Quebec with an official safety message for the president of the company. The messenger to Quebec gets all expenses paid for his trip, in addition to his wages for the days he is away.

Weekly conferences between the company executives and employees have helped substantially in making the Mersey plant safer in all ways. A likeness of a white elephant is the token of accidents. At the end of the first month in the special three months' campaign, the token was formally presented to the mill manager. At the end of the second month, it was turned



K-C SAFETY DAY EXHIBITS

Left—"Safety in the Heart" was portrayed by the exhibit of the Wood Room. "Old Man Accident" is portrayed as the devil, with the safe worker knocking him down. This display won the plaque for safety and attractiveness. Center—The mechanical man in this exhibit of the Groundwood Booth is named "I am a Safe Worker." By an ingenious mechanical arrangement, he pointed with his left hand to the raw material, load of pulp wood, then with his right hand to the finished product, and then to the safety sign. Right—The Sulphite exhibit was very unique. One side depicted safety, the other side the reverse. On either side of the general display were two worlds, the safe and the unsafe, which revolved. Inside the safe world were the happy safe worker and his family, while on the other side the opposite picture was seen in the home of the unsafe worker.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B·F·PERKINS & SON, INC.
ENGINEERS AND MANUFACTURERS
HOLYOKE·MASS
NO CALENDER
CAN BE BETTER
THAN THE ROLLS
IN IT

Left—Washington Pulp and Paper first aid team which won contest. Left to right: Harry Iler, representative; John Monser, captain; Clair McCormick, alternate; Errett Fleener, Earl Baker, W. C. Adams and George Hansen, team members; Jack Venables, patient; Cyril Edmisten, judge. Right—Competition under way on a first aid problem in Elks' Temple, Port Angeles. Winning Washington Pulp and Paper team in foreground, Rayonier, of Port Angeles, second; Fireboard Products, Port Angeles, next; and National Paper Products, of Port Townsend, at extreme rear.

over to the general manager. The third monthly step will be the presentation of the token to Colonel C. H. L. Jones, president of the company. Monthly cash prizes are drawn for at the mill by the employees when there have been no mishaps during the month.

◆

QUEBEC SAFETY ASS'N HOLDS ANNUAL MEETING

The Quebec Pulp and Paper Safety Association held its annual meeting May 4 in the city of Quebec with W. L. Bennett of the Brown Corporation presiding.

At the meeting it was learned that much effort has reduced accidents in the woods but that results have not been satisfactory in the mills. In 1936, claims requiring medical attention only totaled 1,316, but in 1938 the figure rose to 2,783. In woods production, there was a decided drop in compensation cases.

◆

FIRST AID CONTEST WON BY WASH. MILL

The first-aid team of the Washington Pulp and Paper division of the Crown Zellerbach Corporation, competing against three other pulp and paper mills, won first place in a contest held May 5 at Port Angeles, Washington. Men of the Washington team scored 9.8 per cent.

Second place went to the Fibreboard Products team of Port Angeles, while the Port Angeles Rayonier and National Paper Products unit of Crown Zellerbach tied for third. The scores were 94.4 and 94.2, respectively.

Arrangements for the meet were made by personnel and safety directors of the four competing mills. They are: E. P. Read, Washington Pulp and Paper Division; S. W. Grimes, Rayonier, Inc.; Ralph Lawrence, Fibreboard Products, Inc., and Stephen Coney, National Paper Products Company.

◆

NO ACCIDENTS IN APRIL AT NEPCO MILLS

A perfect safety record for the month of April was set up by the Nekoosa-Edwards Paper Company's Nekoosa and Port Edwards mills, which employ approximately 1,200 men. There was not a single lost-time accident in either mill.

The total number of accidents from January 1 to May 1, 1939, was six, as compared to ten during the same period last year. The Port Edwards mill, which won the safety banner in January with one accident to Nekoosa's two, still retains the flag. In February each mill suffered one accident and the March record was the same. By the rules of the safety contest, the banner will remain with the Port Edwards mill until the Nekoosa mill shows a better safety record.

Competition between the two mills is keen at present, inasmuch as the accident score is now four for the Nekoosa mill and three for the Port Edwards mill. A special jackpot of $250 will be divided among the men in the mill having the best record. In addition to this prize, one thousand dollars, $500 for each mill, will be divided among the men in the various departments on the basis of department safety for the two six-month periods.

The Paper Industry Safety Contest

July 1, 1938 to June 30, 1939

Out of 162 mills reporting for April, 15 have perfect record

PERFECT SCORES
Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
GROUP B		
GROUP C		
GROUP D		
Spaulding Fibre Company, Inc.	Milton	New Hampshire
United States Gypsum Company	North Kansas City	Missouri
American Writing Paper Corp.	Mt. Tom Division	Holyoke, Mass.
Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardiner, Me.
Rogers Fibre Company, Inc.	Fibreboard Mill—Div. I	Bar Mills, Me.
The Mead Corporation	Nashville	Tennessee
Central Fibre Products Co.	Vincennes	Indiana
Central Fibre Products Co.	Mt. Carmel	Illinois
Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
Spaulding Fibre Company, Inc.	Hayes Plant	North Rochester, N.H.
Division II—Paper and Board Re-Manufacturing		
The Container Company	Van Wert	Ohio
Bird & Son, Inc.	Chicago	Illinois
Gaylord Container Corp.	Dallas	Texas
Bird & Son, Inc.	Shreveport	Louisiana
Bay West Paper Company	Green Bay	Wisconsin

DEPENDABILITY

WHERE MEANS DOLLARS

USE FAST'S—THE COUPLING YOU CAN TRUST

Paper mill engineers use Fast's Self-aligning Couplings for important applications—because they know it's gambling dollars against pennies to compromise on coupling dependability.

The illustration shows a Fast's Coupling serving in one such important application; the drive of the 202", 1000 foot-per-minute board machine at the Grays Harbor Pulp and Paper Co., Hoquiam, Wash.

Fast's Couplings are dependable under every operating condition. The load carrying surfaces are protected against wear by a positive film of oil. There is nothing that needs replacement, nothing to demand attention other than periodical oiling.

To play safe and prevent operating troubles—specify genuine Fast's Self-aligning Couplings on the machinery you purchase. Koppers Company, BARTLETT HAYWARD DIVISION, Baltimore, Maryland.

FAST'S COUPLINGS

a KOPPERS product

OTHER COUNTRIES

AUSTRALIAN NEWS

Bush Fires

The Royal Commission that has been appointed to investigate the causes of the disastrous bush fires experienced throughout Victoria during January, 1939 (Cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 59, April, 1939), has had an interesting problem presented them from a defense point of view. Australia is dependent upon the United States for oil supplies, gasoline, etc. It is now proposed that the Government put men to work in the fire-killed timber, collecting the ready-made charcoal and converting the standing timber, which has been fire-killed into charcoal so that a very substantial quantity would be on hand in the event of necessity.

▸▸▸ FOR THE PRESENT only mechanical pulp will be made at the Australian Newsprint Mills, Ltd., plant at Hobart, Tasmania. Eventually it is hoped to increase the mill's output and to supply the major part of the chemical pulp required for the kraft process. L. N. Benjamin is the moving spirit behind the company and is a staunch advocate for Australian newsprint.

◆

ITALIAN NEWS

▸▸▸ SEVERAL VERY INTERESTING developments in the production of cellulose in Italy were reported recently from that country. The Italian chemists and technicians, striving to reduce Italy's imports in every line, are utilizing various types of raw materials for cellulose extraction. Most recent experiments, according to an Italian correspondent, are those which use banana leaves, palm tree leaves and what are known as "sugar sorghum stems," as raw materials for the extraction of cellulose.

Banana Leaves

A process whereby the leaves of a banana tree can be utilized for the production of cellulose has been patented recently in Italy. The process, as far as can be ascertained, consists of a simple treatment with steam and a lime bath. Leaves and branches are immersed in a 15 to 20 per cent solution of quick lime which is brought to 120 degrees C. The material is saturated in this solution for about five hours. The pulp obtained by this process is reported to have a fairly high cellulose content. Much interest has been aroused over the process in Italy due to the fact that the banana tree is so common in the Italian African colonies.

Palm Tree Leaves

Also patented in Italy is a new method for extracting cellulose from palm tree leaves. This process has two distinct treatments. The first treatment reduces the raw material by mechanical means to fine filaments resembling those of ordinary hemp. The fibers, by this process, are not cut or broken in any way. The filaments are then subjected to a second treatment in which they are given an alkaline bath first under ordinary pressure and then in an autoclave.

Sugar Sorghum Stems

Laboratory experiments to extract cellulose for papermaking from the residue of sugar sorghum stems have been conducted for some time in Italy. The methods used in this case are based on the use of sodium sulphite and gaseous chlorine. Researches with this chemical process, in accordance with a traced program, led to semi-industrial production and finally to a regular industrial output. The yield in white cellulose was around 40 per cent.

The strength of sugar sorghum cellulose was found to be somewhat superior to straw cellulose. The sugar sorghum cellulose was mixed with poplar and pine cellulose and with mechanical wood pulp to produce paper. According to reports, the pulp ran through all operations satisfactorily and did not require any particular modifications in the normal working cycle.

◆

ENGLISH NOTES

Esparto Position

According to reports from England, the situation in regard to esparto grass supplies in that country is still unusual due to the recent war. Following the quota system recently introduced into the French fields, an advance in prices has been noted but British papermakers are covered for supplies this year. The Spanish grass, however, has not been collected for nearly three years and as there is a general desire to get the soldiers back to work, it is expected that the grass will be collected very shortly. These fields are not subject to any quota system, so, consequently, there is the possibility of a good supply of grass reaching the market. Although in the past the Spanish grass has been more costly than the French, the need for money in Spain may bring the price below the French figure.

Machine Wire

Considerable progress is being made in England with the new improved machine wire and the production of even-sided papers. Recent examples include a bulky antique wove. Its value to book printing is demonstrated by use of heavy solids and half-tones in 133 screen. Offset printings and imitation arts have also been produced on these new wires with equal success.

◆

BRITAIN USES PAPER FOR AIR RAID DEFENSE

An interesting use of paper in connection with England's current air raid protection activity was revealed recently by the Forest Products Division of the Department of Commerce. The paper is most commonly made from specially-prepared kraft paper attached to a sheet of black paper and is designed to facilitate the "blackout" of a city in the event of an air attack.

According to reports, the paper is resistant to fire, water and gas. It contains properties which prevent the light from passing through and thus is a valuable article in eliminating lights from the view of air raiders. Although large amounts of the paper would be required in case of an emergency, no new mills are planned for the manufacture of the product.

It is interesting to note, however, that Great Britain has become an increasingly important market for kraft paper produced in the southern part of the United States, according to the Department of Commerce.

◆

▸▸▸ THE FOUR LEADING PURCHASERS of uncoated book paper from the United States for the first quarter of 1939 were Cuba, Canada, China, and the Philippine Islands. The Orient was the major market for over-issue and old newspapers.

KINK OF THE MONTH "in the interests of more efficient cleaning"

THOROUGH OAKITE WASHING makes your felts SOFTER!

You can tell at a glance that an Oakite-washed felt is clean! It looks that way, and it is! Fresh, soft, absorbent, notice how free it is from all sizing and foreign matter. Oakite materials rinse freely . . . completely.

After thorough Oakite washing, your felt is much more absorbent. It takes longer to fill up. That means less frequent cleaning AND longer felt life.

Write for full information. No obligation.

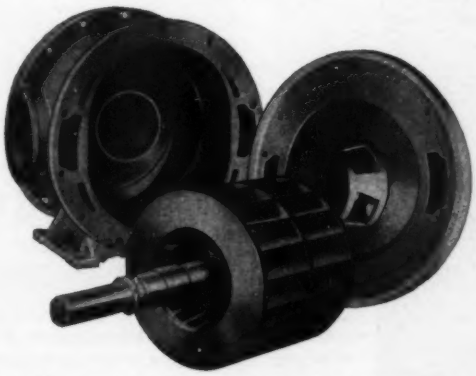
OAKITE 1909 1939 30

Manufactured only by
OAKITE PRODUCTS, INC.
16 Thames Street New York, N. Y.

Representatives in All Principal Cities of the U. S.

OAKITE *Certified* CLEANING
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

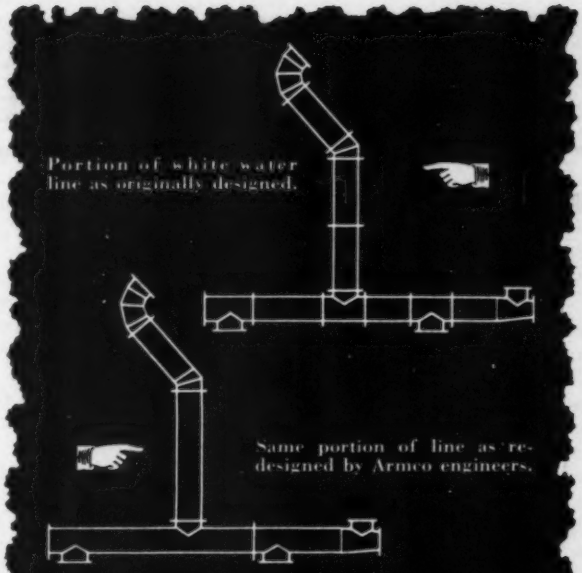
SIMPLICITY



NASH VACUUM PUMPS HAVE ONE MOVING PART

Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment or lubrication.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.



With Armco Spiral Welded Pipe the design was simplified and costs cut by eliminating unneeded joints.

THIS PAPER MILL Saved $556.85 ON ONE PIPING JOB

To cut the cost of a piping job as much as 36% seems almost too good to be true. Yet that's what one large mill recently saved by using Armco Spiral Welded Pipe for a new white water line. Here's the story:

As originally designed the pipe would have cost $1521.27. As redesigned by Armco engineers—using longer lengths, shop-welded fittings and fewer flanges—the cost was only $964.42.

What's more, savings didn't stop with this reduction in purchase price. Armco Pipe combined ample strength with light weight for easier handling and hanging. And fewer joints meant less assembly work. Maintenance is sure to be less because there are fewer potential sources of costly joint leakage.

Possibly similar savings can be made on *your* next pipe installation. Armco Pipe is available in diameters from 6 to 36 inches—wall thicknesses from 7/64 to 1/2-inch—with optional coatings. Just send us your specifications. The American Rolling Mill Co., Pipe Sales Div., 1280 Curtis St., Middletown, O.

ARMCO

ARMCO SPIRAL WELDED PIPE

ALLIED

MUSEUM GETS EXHIBIT FROM CRANE COMPANY

The Crane Company, Chicago, has made a gift to the Museum of Science and Industry, Chicago, of a valve of the type used to control the flow of water in canal locks, reclamation projects, municipal water systems, large industrial plants and super-power generating stations.

The valve is a 72-inch iron body gate valve, brass trimmed, and weighs a trifle more than 17 tons. The size of the valve aperture is 6 ft. The depth of valve at aperture is 3 ft. 9⅛ in. Its width at aperture, not counting the by-pass valve, is 7 ft., 5 in. Its height is 18 ft., 5 in., counting the cast iron base but not counting the platform. Appropriate ceremonies are planned for the dedication which will take place probably by next fall. Water from streams, lakes, oceans, bays, etc., all over the world are being collected for the ceremony in which Dr. Phillip Fox, director of the Museum, and Charles B. Nolte, president of Crane Company will officiate. Water from the eastern hemisphere will be kept separate from water from the western hemisphere and the two will be merged as the "Waters of the World" in recognition of the fact that the valve was one of a type made for the Panama Canal.

The accompanying illustration shows the valve already permanently installed in stair well No. 2 by the Museum's main rotunda. The iron stairways that have been built up to the 6 ft. aperture from both sides will make it possible for visitors to pass through the valve.

◆

BUELL-STURTEVANT COMBINE SERVICES

The Buell Engineering Company of New York, and the B. F. Sturtevant Company of Hyde Park, Boston, recently completed arrangements whereby the Sturtevant field organization, operating out of the forty Sturtevant offices, will parallel the work of the Buell service staff.

The Buell testing laboratory in New York will be complemented by the Sturtevant laboratory in Boston, while the Van Tongeren laboratory in Holland, which devotes itself to the scientific solution of dust problems, will cooperate closely with both of the American laboratories.

Besides increasing the service facilities of both companies, the new arrangement enables the customer to secure, one at a time, from a single source, both dust or fly ash equipment and fan equipment as a complete system with no division of responsibility.

◆

GRAHAM UNIT NOW SOLD BY BRIGGS AND STRATTON

The Briggs & Stratton Corporation, Milwaukee, Wisconsin, well known as manufacturers of small 4-cycle gas engines and automotive equipment, has entered the variable speed transmission field. The firm announced recently that it has obtained exclusive rights for the manufacture and sale of the Graham unit, now to be called the Briggs & Stratton Variable Speed Transmission. The Milwaukee company has been manufacturing the Graham unit for a year and a half for Graham Transmissions, Inc.

The transmission gives speeds in infinite steps from maximum to zero and reverse, is self-contained, runs in oil, and is all metal in construction, permits change in speed both running and stationary and develops full torque over the entire range of speed.

◆

STALEY CO. PLANS NEW PLANT IN OHIO

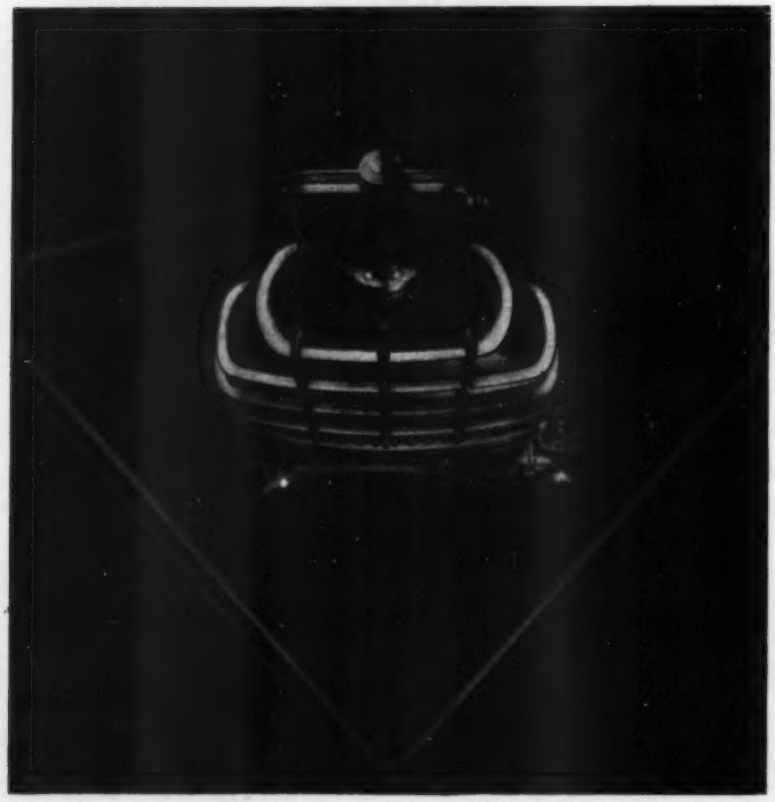
The A. E. Staley Manufacturing Company, Decatur, Illinois, one of the largest manufacturers of corn products and soybean oil and feed, will establish a new soybean plant at Richmond, Ohio, near Painesville.

The Staley organization, well known in the paper industry by reason of their products for tub sizing and coating, will establish the new plant at the Baltimore and Ohio Railroad elevator on the Grand River. The site has excellent water and rail facilities.

It has not been determined as yet to what extent existing buildings and equipment can be used, but it has been announced that the H. K. Ferguson Company of Cleveland will handle the

(Continued on page 362)

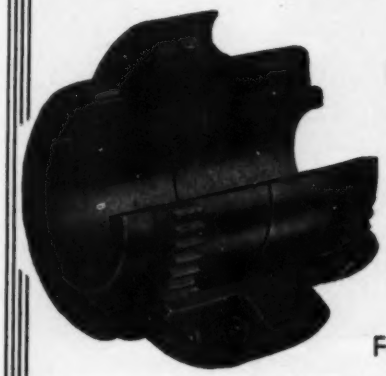
Crane valve installation at Museum of Science and Industry.



ADVERTISING PAGES REMOVED

POOLE

FLEXIBLE COUPLINGS



All Metal
Forged Steel
No Welded
Parts

•

Oil Tight
Free End Float
Dust Proof
Fully Lubricated

Send for a copy of our
Flexible Coupling Handbook

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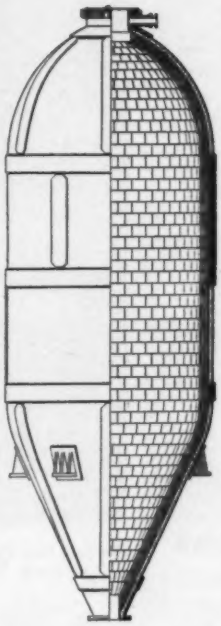
POOLE FOUNDRY & MACHINE CO.
BALTIMORE, MD.



Digester Linings

THAT
PAY FOR
THEMSELVES

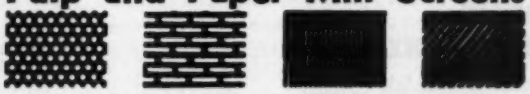
in

INCREASED LIFE
CLEANER PULP
PROTECTION

•

CHEMICAL LINING ENGINEERS INC.
832 BUILDERS EXCHANGE MINNEAPOLIS, MINN.
In Canada:
CHEMICAL LINING ENGINEERS LTD., Ft. Frances, Ont.

Pulp and Paper Mill Screens



of STAINLESS STEEL—COPPER—BRONZE—
MONEL—CHEMICAL RESISTING ALLOYS
Perforations that are accurate in size and alignment
ANY METAL •• ANY PERFORATION

The Harrington & King PERFORATING Co.

5634 Fillmore St., Chicago, Ill., • 114 Liberty St., New York, N.Y.

WATERBURY FELTS

Are Made By

H. WATERBURY & SONS CO.
ORISKANY, NEW YORK

HIGHEST QUALITY CLAYS

LUMP AND POWDERED } IMPORTED

EASTON, PENNSYLVANIA, U.S.A. PAPER MAKERS IMPORTING CO. INC. PMI

DOMESTIC { CRUDE CRUSHED
AIRFLOATED
WATER WASHED

PRECIPITATED CALCIUM CARBONATE

(Continued from page 356)

engineering and the installation of equipment. In the new plant soybeans will be crushed to produce the two principal products, soybean oil and soybean oil meal. The oil is used in salad and cooking oils and the soybean oil meal is used as protein concentrate feeds for cattle and other live stock.

The Staley company expects to push the installation work to a rapid conclusion and every effort will be made to have the plant in operating condition by October 1. While definite figures are not yet available, it is estimated that an immediate expenditure of $200,000 will be made on the property.

◆

MAGNUS SALES MEET LARGEST IN ITS HISTORY

The annual Eastern Sales Conference of the Magnus Chemical Company, Inc., Garwood, New Jersey, was held May 4, 5, and 6 in Elizabeth, New Jersey. The conference, the largest regional meeting ever held by the company, was attended by over 45 members of the field organization and executives of the home office. Sessions were held in the Winfield Scott Hotel.

The program of the conference sessions was designed to bring out very clearly, leading points of work included in the industrial cleaning field. Various members of the sales staff presented different phases of cleaning work and demonstrated how Magnus materials fit in with the problems and requirements of certain cleaning operations. Many improvements made in existing products and a number of new products were described in detail.

The program, in addition to covering cleaning problems, also included the advertising and sales promotion program for the year, outstanding sales records and several interesting sales movies.

Eastern Sales Conference, Magnus Chemical Company.

◆

INVENTION WINS LONGSTRETH MEDAL

The Edward Longstreth Medal, given for "inventions of high order and for particularly meritorious improvements and developments in machines and mechanical processes," was awarded this month to Arthur C. Hardy, inventor of the recording spectrophotometer. The instrument found its first commercial applications in the field of graphic arts, where it has helped to establish more accurate standards of color measurement. The Longstreth medal was awarded to Mr. Hardy by the Franklin Institute.

The first recording spectrophotometer to be put in commercial service is used by the International Printing Ink Co. to analyze and measure various types of printing.

The first commercial recording spectrophotometer was installed three years ago at the research laboratories of the International Printing Ink Company, where Professor Hardy is a member of the consulting staff. Since that time it has been applied to a variety of problems affecting color printing, color lithography and paper manufacturing. The Institute of Paper Chemistry uses the instrument, as does the United States Bureau of Printing and Engraving and the United States Bureau of Standards.

◆

F-B COMPANY HAS "OPEN HOUSE DAY"

Over six thousand people availed themselves of the opportunity to visit the plant of the Farrel-Birmingham Company, Inc., Ansonia, Connecticut, recently, when the company held a special "Open House Day." The occasion provided the families and friends of the workers a chance to see the inside of the plant, its facilities and equipment used to produce the castings, rolls and heavy machinery which are the product of the F-B plant.

The Open House program, which

For Sale—Paper Machinery

Paper Machines: 72 in., 126 in.
Experimental Fourdrinier Paper Machine with wire 46 in. by 50 ft., 2 presses, Minton vacuum dryer, worn gear drive.
Calender Stacks: 116 in., 114 in., 104 in., 100 in., 90 in., 88 in., 84 in., 76 in.
Super Calenders: 44 in., 72 in., motor driven.
Sheet Cutters: 72 in., 94 in., 108 in., 136 in., duplex with or without layboys; single: 44 in. to 100 in. (20 cutters and layboys).
Slitters: 60 in. Cameron. 60 in. Kidder.
Trimmers: 2-50 in. Seybold.
Dryers: Several hundred, from 42 in. to 100 in. face.
Fourdrinier Part: Late type, Moore & White, takes wire 80 in. by 50 ft., with Voith inlet and suction couch.
Jordans: 3 Jones, 2 Emersons, 2 Appleton.

BEATERS—PUMPS—ROLLS—REEVES DRIVES

Write to us when you want to sell Paper Mill Machinery

FRANK H. DAVIS CO.
175 Richdale Avenue, Cambridge, Massachusetts

STOCK PREPARATION EQUIPMENT

Dilts

MACHINE WORKS Inc. FULTON, N.Y.

MEN ——— SALARIED POSITIONS ——— WOMEN

$2500 to $15,000

Our confidential system promotes you for high salaried positions at small cost.
Write for valuable information to Paper Dept.

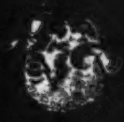
EXECUTIVES PROMOTION SERVICE
Washington, D. C.

ATTENTION MANUFACTURERS!

If you are a producer of raw materials used by paper mills and would be interested in Southern Ohio representation, Address Box 296, FRITZ PUBLICATIONS, INC.

THE TRADE-MARK OF GOOD FELTS

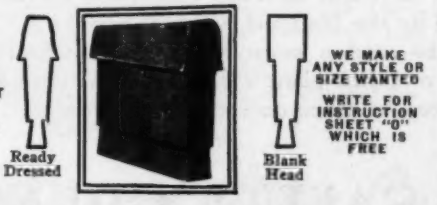
The Waterbury Felt Co.
SKANEATELES FALLS, N.Y.



"READY DRESSED" **MILL COGS**

LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL



WE MAKE ANY STYLE OR SIZE WANTED

WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., South Bend, Ind.

ONE *Always Stands Out!*

SIZZLING drives . . . short shots . . . quick work at the net . . . in tennis the player who can *adapt* his game to different playing situations is the *one who stands out* from the rest.

This same *ability to adjust* is what makes GARLOCK 711 "Z" Packing *stand out* above other packings manufactured for similar service. Diagonal in construction, GARLOCK 711 *expands and contracts* to conform with rods that are worn, out-of-line or subject to lateral motion.

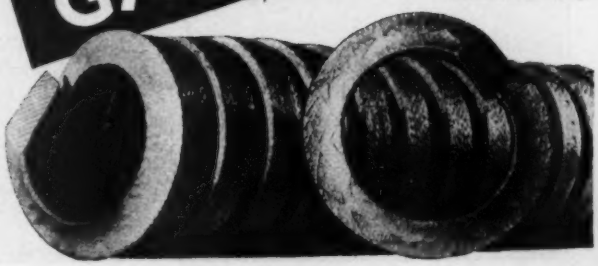
GARLOCK 711 is made of closely woven duck and a high grade rubber compound. For service against medium and low pressure steam, hot or cold water and ammonia. All sizes from ¼" to 1½".

THE GARLOCK PACKING CO.
PALMYRA, N. Y.

In Canada: The Garlock Packing Company of Canada Limited, Montreal, Que.

GARLOCK 711

GARLOCK 711—Spiral
GARLOCK 712—Rings



was managed entirely by the employees of the company through employee committees of their own choosing, included a hobby show and exhibits of everyday products made on Farrel-Birmingham machinery.

◆

BAGLEY AND SEWALL BOUGHT BY A. COOPER

The Bagley and Sewall Company, Watertown, New York, one of the oldest industrial concerns in the state and highly regarded by the pulp and paper industry, is now controlled by A. Cooper, of Syracuse and Watertown, who closed an option on May 25 to purchase the 30,000 shares of capital stock of the company. Mr. Cooper already has taken over control of the plant, although title will not pass for several weeks.

The Bagley and Sewall Company is one of the best known equipment firms in the United States. It was founded September 1, 1853, by the late George A. Bagley, Edmund Q. Sewall and George Goulding, under the name of Goulding, Bagley and Sewall. Mr. Goulding retired in 1861 and the company then became known as Bagley and Sewall. It was incorporated in 1882 and until the Cooper purchase the Bagley and Sewall families have owned it for 77 years and controlled it for 86 years.

Mr. Cooper will continue the business in its present status. In addition to building new fourdrinier and cylinder papermaking machines, he will also rebuild and sell old machines. Ample working capital is now available as three large banks are supplying Mr. Cooper with funds. Mr. Cooper will take no official title although he will be the directing force of the business of the company.

There will be no change in the official personnel of the company. Clarence E. Kinne will remain as president and general manager while Carroll L. Thompson will continue as treasurer, Harry C. Kinne as secretary and sales manager, and George M. Pennock as mechanical engineer.

◆

LOBDELL CAR WHEEL BUYS NAZEL ENGR.

The Lobdell Car Wheel Company, Wilmington, Delaware, well known in the paper and railroad fields, has purchased the business of the Nazel Engineering and Machine Works located at Philadelphia, Pennsylvania.

The Lobdell organization will continue the business established by John Nazel in 1900. Howard W. Wimer, who has been associated with the Nazel business for thirty-five years, will continue to supervise the Nazel Hammer and Dill Slotter division.

◆

MILWAUKEE IS SITE OF NEW LIMESTONE CO.

A new source of graded and washed limestone for Wisconsin contractors and other industries, including those in the paper field, is now to be found in the newly-incorporated Inland Lime and Stone Company of Wisconsin. The new company, which has leased 400 feet of dock space on W. Canal Street on the Menominee River in Milwaukee, will stock graded sizes of limestone and stone-sand for truck or rail delivery.

Officers of the new company are: Clarence B. Randall, president; P. D. Block, Jr., vice president; W. D. Truesdale, treasurer, and J. H. Morris, secretary. Gordon W. Hughes is sales manager. The Inland Lime and Stone Company is a subsidiary of the Inland Steel Company.

Facts About Accidents in the Paper & Pulp Industry

Interesting and Valuable!

Contents . .

- Outstanding Facts
- Comparison with other Industries
- Experience by Type of Industry
- Experience in various types of Mills
- Experience in various Departments
- Causes of Serious Accidents
- Disabling Injuries by Industrial Groups
- Types of Accidents
- Best All-Time Records
- Individual Plant Records

What were the outstanding facts about accidents in the Paper & Pulp Industry during 1937? How did they compare with other industries? How did your plant's record compare with others?

These and many other revealing and important data are presented in detail in "1937 Accident Rates In the Paper & Pulp Industry", recently published by the National Safety Council. We'll be glad to send a copy FREE to any Safety Director or other plant executive upon request. Simply drop us a line on company letterhead.

PAPER & PULP SECTION NATIONAL SAFETY COUNCIL
TWENTY NORTH WACKER DRIVE CHICAGO, ILL.

MEET THE MEN WHO
SELL ORR FELTS
If you have a felt problem, here are the men to help you solve it.
Mr. Eilers, dean of the "force," has been contacting the mills for many years. The same holds true of Messrs. Purdy, Scott, Hodges and Casparis. If these men have cooperated on one felt problem, they have cooperated on a thousand. Why not take advantage of their broad experience?
And remember this—the superior water removal qualities and longer wear of Orr Felts account for the Orr plant being the largest felt mill in the world.
THE ORR FELT AND BLANKET COMPANY
Piqua, Ohio
ORR FELTS

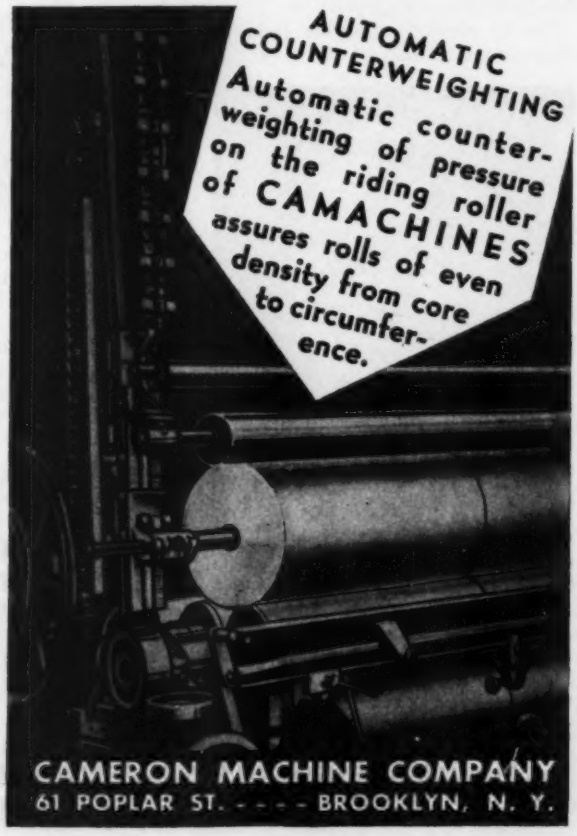
NO Pipe Line CONNECTIONS in the New Murray KNOT DRILL

Operates on proven principles of oil drives used on modern precision machine tools.

A new idea in Knot Drill design and construction that combines all of the desirable features of a mechanical, water, air, or steam driven drill and with new features not found heretofore in any machine of this type. This new Knot Drill is flexible in operation and instantly adjusted to the top working speed of the operator. It is faster; self-contained; simple in construction; adjustable as to speed; and positive in action. This new drill is sturdily constructed, built for service, and will reduce cleaning costs while increasing efficiency and production. Write for complete details.

D. J. Murray Mfg. Co.

WAUSAU ~ WISCONSIN.


AUTOMATIC COUNTERWEIGHTING
Automatic counter-weighting of pressure on the riding roller of CAMACHINES assures rolls of even density from core to circumfer-ence.
CAMERON MACHINE COMPANY
61 POPLAR ST. - - - - BROOKLYN, N. Y.

PERSONALS

THROCKMORTON HEADS NEW ASS'N OF PACKAGING

E. A. Throckmorton, general manager in charge of sales promotion activities for the Container Corporation of America, has been chosen to head the recently-formed Furniture Prepack Association, which organization was formed to launch a significant move in the paperboard container industry.

The new paperboard group anticipates rapid changes that may revolutionize present-day methods of packing, storing, and merchandising furniture. At present, the group has three objectives. In addition to recommending new specifications for furniture packing to the railroad classification committees, the container industry expects to conduct a personalized advisory service to furniture manufacturers and retailers, pointing out advanced methods of furniture packaging in paperboard. Similarly, in their own industry, the paperboard group expects to establish and maintain uniform packing practices.

In its present state, the industry organization consists of the American

E. A. Throckmorton

Box Board Company, Container Corporation of America, Fibre Board Container Company, Gaylord Container Corporation and the Hinde and Dauch Paper Company. The group has extended invitations to virtually every American paperboard manufacturer in America.

NEW PROMOTIONS AT WORTHINGTON

Several new executive promotions were made recently at the Worthington Pump and Machinery Corporation, Harrison, New Jersey.

Edwin J. Schwanhausser, works manager of the pump corporation's Buffalo plant, has been elected a vice president and will continue in his present duties. Mr. Schwanhausser has been associated with Worthington since 1915 and has served that organization in a number of capacities. His duties at the Buffalo works have been concerned with the development of Diesel and gas engines, air and gas refrigeration compressors, products of that works.

In addition, it is announced that William Scherer, formerly works manager for the Holyoke (Massachusetts) division of Worthington, is now assistant to the vice president in charge of manufacturing at all Worthington plants. Mr. Scherer was formerly superintendent of the East Springfield works of the Westinghouse Electric and Manufacturing Company.

Coincidental with these promotions, it was made known that H. Herbert Brautigan, formerly assistant works manager at Holyoke, is now manager of the latter division, and that Harold W. Stoddard has been transferred to Holyoke from Harrison as assistant to the sales manager of the deep well pump division.

Now directors of Worthington Pump and Machinery Corporation are Clarence E. Searle, vice president in charge of sales, and H. C. Ramsey, in general administrative charge of operations. Mr. Searle has been associated with Worthington since 1932, while Mr. Ramsey has been connected with the equipment firm since 1920.

◆

C. S. PARKER FIFTY YEARS WITH REVERE

Fifty years of continuous service with the Revere Copper and Brass, Inc., by Clarence S. Parker brought special recognition from the company recently when a sterling silver plaque, suitably engraved, was presented to Mr. Parker at a dinner held by the Revere Copper and Brass Foremen's Association on May 26. Presentation of the plaque was made by F. J. Caroll, production manager, who has himself served in the company's organization for 40 years.

Mr. Parker started work as an assistant to the foreman in the cast shop and yellow metal mill at Taunton, Massachusetts, on May 1, 1889. Through a series of promotions, he was elevated to the position of superintendent of both the Taunton and New Bedford plants of the company. Mr. Parker is now enjoying excellent health at the age of 70, and is at present serving in an advisory capacity.

◆

W. GEIST MADE VICE PRES. OF ALLIS-CHALMERS

Associated with the Allis-Chalmers Manufacturing Company since 1909, Walter Geist has been appointed vice president of the company.

Mr. Geist entered the Milwaukee (Wisconsin) equipment company as an errand boy in the saw mill engineering department. From that position, he advanced to draftsman and progressed through various positions and departments, from which he derived a broad knowledge of the various products of the company. Mr. Geist originated the idea of the multiple V-belt drive principle of power transmission, known as the Texrope Drive, which, while

W. Geist

it was originally conceived for the textile industry, has a broad application throughout industry in general.

In 1933, Mr. Geist was appointed general representative, in which capacity he supervises the personnel of all district offices of the Allis-Chalmers organization.

RUGGED

FIG. 102
BRONZE GLOBE
VALVE.

FIG. 375
BRONZE GATE
VALVE.

FIG. 150
BRONZE GLOBE
VALVE.

RUGGED VALVE CONSTRUCTION IS ESPECIALLY DESIRABLE TO THE ENGINEER. IT MEANS WITHSTANDING ABNORMAL WORKING CONDITIONS - - - YEARS OF SAFE, TROUBLE-FREE VALVE PERFORMANCE

Specify

POWELL VALVES

THE WM. POWELL CO. CINCINNATI, OHIO

Edward A. Mead

▶▶▶ For past ten years, assistant sales manager of the Nash Engineering Company, *Edward A. Mead* is now sales manager of the South Norwalk (Connecticut) company. Mr. Mead has been associated with Nash Engineering for fourteen years and is well known in the equipment field.

◆

FRANK TIMMERMAN RECOVERING FROM AUTO ACCIDENT

The many friends of Frank J. Timmerman, mill manager of Northern Paper Mills, Green Bay, Wisconsin, will be happy to learn that he is steadily recovering from injuries received in an automobile accident in New York State.

In a recent letter to the editor of this magazine, Mr. Timmerman stated that he expected to be in the hospital (Corinth, New York) for another two or three weeks, and would then spend a little time in the town before he was quite up to making the trip home. However, it seems quite certain that the friends in the home town will be getting ready to give him a cheerful welcome before very long.

◆

L. V. FORMAN WINS SWEDISH FELLOWSHIP

Loren Verne Forman, a third year student at the Institute of Paper Chemistry at Appleton, Wisconsin, is the recipient of the 1939-40 Nils R. Johaneson Fellowship and will spend the next year studying in Sweden and touring the mills of that country. The Fellowship, which was announced by the American Scandinavian Foundation, is awarded annually to a graduate American student for a year's study and research in the pulp and paper industry in Sweden. It is the gift of Nils R. Johaneson, president of Cellulose Sales Company, Inc., New York, N. Y.

Mr. Forman obtained his bachelor of science degree in chemical engineering at Iowa State and his master of science degree at Lawrence College in Appleton. He will leave for Sweden during the summer and will return a year later to complete his study for a doctor's degree.

◆

PAPERMAKER TAKES DEER FOR A RIDE

Clarence E. Jackson, manager of the Wisconsin Rapids mill of the Consolidated Water Power and Paper Company, never hunted in his life but on May 28 he bagged a deer weighing about 100 pounds—without a gun!

Mr. Jackson, who does not wish to emulate Mr. Frank Buck (the deer was quite dead), used his automobile as a lethal weapon. While he was driving between Meehan and Plover, the deer jumped up and darted in front of his car and the headlight and fender caught the animal and killed it instantly. "My first deer—and out of season too," was the paper mill man's comment.

◆

▶▶▶ *L. L. Griffiths, Jr.*, who has for many years been representing the Heller and Merz Corporation in the Middle West, will join the Williams-Gray Company, dealers in paper mill supplies, in Chicago, on June 15.

◆

FARGO IS NOW PRESIDENT OF CALCO CHEMICAL

F. Miller Fargo, Jr., executive vice president of the Calco Chemical Company, Inc., Bound Brook, New Jersey, has been elected president of the company succeeding Robert C. Jeffcott, who retired April 30. Mr. Fargo has been connected with the Calco Company since it was founded in 1915 by Mr. Jeffcott.

The company, which was formed at the outbreak of the World War to supply certain dyes and dye intermediates which had been previously imported, is one of the leading dye-stuff manufacturers in the United States. It became a subsidiary of the American Cyanamid Company in 1929.

Close-ups

TWO PAPERMAKERS MAKE A "CATCH"

▶▶▶ NOW THERE'S REALLY NOTHING kindred in the science of papermaking and the science of piscatology nor is there any reason why men who are proficient in one science should be equally proficient in the other. Yet, from a report that comes out of the wilds of the Schrieber district of Ontario, it is learned that there are at least two such dual experts.

Chris Michels, superintendent of the Great Lakes Paper Company, Ltd., Fort William, and Ray Wheatley, technical control superintendent of the same company, get the honors this year for making the first 1939 fishing news in THE PAPER INDUSTRY AND PAPER WORLD. Mr. Michels and Mr. Wheatley, two gentlemen who really know their rods (and their reels), returned from a week-end fishing trip at Ross Lake, Ontario, May 21, with a mess of beautiful speckled trout which weighed 20 pounds cleaned. Although, at the time, the trout were reported "not biting up to standard" the two papermakers hauled in eleven of the species before calling it a day. The largest of the catch weighed four and a half pounds.

According to the *Fort William Daily Times Journal*, which featured a story about the event, there was still six feet of snow around the fishermen's cabin. In fact, the two sportsmen used snow and ice in the immediate vicinity to pack their catch. Although others had fished at Ross Lake earlier in the season, Messrs. Michels and Wheatley's catch was termed "one of the loveliest" this year.

C. Michels (left) and R. Wheatley pose with their catch of speckled trout just to prove it is no "fish" story.

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Knotters — Pulp Screens — Float Valves — Consistency Regulators —Weight Regulators—Color and Alum Meters—Metering Systems

MORRIS
CENTRIFUGAL PUMPS
Write for interesting and useful bulletin on Non-Clogging Pumps for handling pulp, and centrifugal pumps for other mill processes and services.
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SWENSON EVAPORATOR COMPANY
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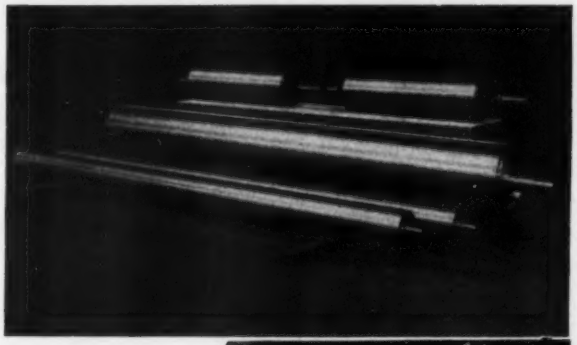
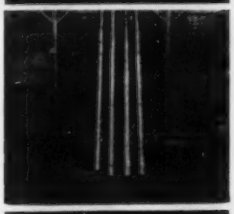
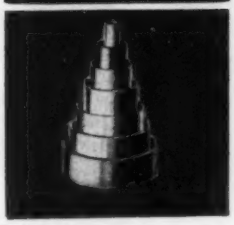


Centrifugally Cast
SANDUSKY
Heavy Wall Tubing

•BRONZE
•BRASS
•COPPER
•MONEL
•ALLOY IRON



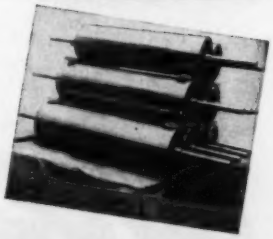


3"—46" Diameter, made to order—any length, thickness, composition and finish.

• Sandusky products are made by a special method for producing roll shells, tubes, liners and bushings having much greater strength and life than conventional material.

• Sandusky roll shells have a dense, fine grain-structure. The metal is sound and uniform. Sandusky shells are readily machined and assembled into rolls. They are round, concentric and straight. They are seamless, solid metal and can be reground indefinitely. They can be made of a hundred different alloys to meet demands for maximum service.

WHAT OTHER MATERIAL COULD YOU USE TO *APPROACH* THESE ADVANTAGES ? ? ? WRITE FOR ILLUSTRATED BULLETIN NO. 537.



Sandusky Cast is PRESSURE TIGHT
Sandusky Foundry & Machine Company

▪ NECROLOGY ▪

S. C. FOSTER

Chief engineer of the Bedford Pulp and Paper Company, Inc., Big Island, Virginia, for nearly twenty years, Spottswood C. Foster passed away recently from a heart ailment.

Mr. Foster started with the Bedford Pulp and Paper Company as an engineer in 1920. He was subsequently superintendent of the Colemans Falls mill of the company until 1930 when he was transferred to Big Island to build Bedford's new steam power plant. In addition to these duties, Mr. Foster was chief engineer of the Hydro-Electric Corporation of Virginia, vice president of the Bank of Big Island, and vice president of the Big Island Realty Corporation. He also developed several improvements in water wheel governors and was co-inventor of a pulp making process.

Mr. Foster was a member of the Southeastern Division of the American Pulp and Paper Mill Superintendents Association, of which he was at one time chairman; the Society of American Military Engineers, Southern Gas Association and many other industrial associations and organizations. He was

S. C. Foster

chairman of the Republican Committee of the First Virginia Congressional District from 1916 to 1920 and city chairman of Fredericksburg, Virginia, from 1912 to 1920.

Surviving Mr. Foster are his widow and two children, a son and a daughter.

LOUIS W. NEWCOMER

A pioneer in the paper industry of Monroe, Michigan, and well known in the entire field, Lewis W. Newcomer, treasurer of the Consolidated Paper Company, passed away May 23 at the age of 77.

Mr. Newcomer was born in Ellsmore, Ohio, in 1861. When a young man, he purchased a half interest in the general store of his brother-in-law, the late E. C. Rauch, formerly president of Consolidated. Later he became associated with the clothing store business, and in 1904 he organized the Monroe Binder Board Company with the late L. W. Leathers. They operated the business until 1921 when it became consolidated with the Boehme and Rauch Company to form the present Consolidated Paper Company. In the merger, Mr. Newcomer became treasurer and a director and has served continuously ever since.

Mr. Newcomer was very active in civic affairs and had served as treasurer of the Monroe Industrial Commission for eight years. He was also president of the Monroe State Bank since its reorganization in 1932.

Besides his widow, Mr. Newcomer is survived by five children, two sons and three daughters, in addition to twelve grandchildren.

Appleton Wires are Good wires

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THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

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NEW ENGLAND AGITATORS
serve paper mills well

Installation Check-Up

Customer: [redacted] Mechanicsville, N.Y.

Application: Clay mixing - # lbs. to gallon of water with some starch.

Tank: Steel, 6'x6' coned 45° with 54" flat bottom, closed top. Tank in two 36" sections. 4 - 4" baffles.

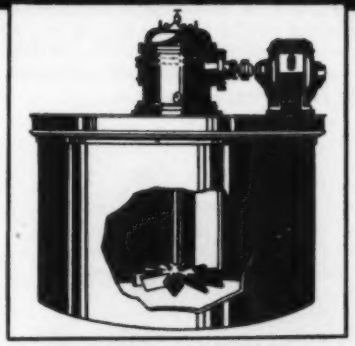
Agitator: 24" C. I. turbine; 18" propeller 4' from bottom.

Speed: 94 R.P.M.

Drive: New England WT-17, ratio 15.5 to 1.

Motor: 3 H.P., 1450 R.P.M.

Results: Agitation satisfactory.



Faster mixing and more uniform densities have been reported from many paper mills after installation of New England Agitating Equipment especially designed for clay or size mixing.

★

80 Page Catalog 380 with Agitation Engineering handbook section free. Write for a copy.

Installation Check-UP

Customer: [redacted] Fitchburg, Mass.

Application: Mixing 2 lbs. clay to the gallon. Used both for mixing and storage.

Tank: 12' deep, 10' dia., with fillet 18" wide, 45° in outer corner, four lines of baffles projecting inward 6".

Agitator: 36" dia. 6-blade, C. I. spiral turbine and 40" diameter., 30 pitch, 3-blade, C.I. propeller, 6' above turbine.

Speed: 100 R.P.M.

Drive: New England WT-47, ratio 11.33 to 1.

Motor: 15H.P., 1140 R.P.M. Power input about 12 H.P.

Results: After standing and allowing clay to settle it can be brought into uniform suspension in 6 minutes.

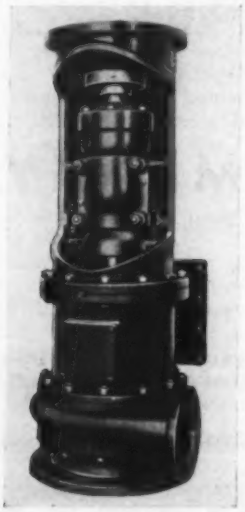
NEW ENGLAND TANK AND TOWER CO. MAIN OFFICE AND WORKS **EVERETT, MASS.**

NEW YORK • CHICAGO • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • LOS ANGELES • TACOMA • SPOKANE
SEATTLE • PORTLAND • DETROIT • VICTOR, N. Y. • NORFOLK • ROANOKE • ASHEVILLE • COLUMBIA

NEW EQUIPMENT AND SUPPLIES

Vertical Centrifugal Stock Pump

Goulds Pumps, Inc., Seneca Falls, New York, has developed a vertical centrifugal stock pump, designated as Figure 3115, that is stated to be particularly adaptable for decker, washer or thickner service. In this design of pump the casing is of close grained cast iron; the impeller, which is of the two-vane warped type, of bronze; the shaft, which is extra heavy, of alloy



treated steel; and the bearings, anti-friction, assembled with the shaft and impeller, and completely enclosed.

Among the features of this pump cited by the manufacturer are: accessibility of rotating element for examination or repair; shaft, impeller and bearing assembly renewed without disturbing suction or discharge connections; all passages extra large and direct, allowing free flow of heavy stock directly into eye of impeller; bearings amply large for all loads; axial adjustment for taking up for any wear in impeller or side plate; a large rectangular suction connection for mounting pump on stock chest or other chamber; hand hole for cleaning; and two washout connections, directly under back of impeller.

The pump, in addition to being furnished as outlined, can be supplied in all iron or all bronze construction.

Color Matcher and Analyzer

The development of a new design of the *Schoenberg color matcher and analyzer* has been announced by the Light Research Sales Agency, 1443 West Harrison Street, Chicago. This instrument, based on the electrical measurement of reflected light, is equipped with an indicating meter, the scale of which has two calibrations—one from zero to 100 and the other from zero to 33⅓. The zero to 100 scale is for use in making brightness comparisons and for general overall tests where color is not considered; the zero to 33⅓ scale, for making blue, green and red color tests.

The movement of the indicating meter is of the suspension galvanometer type. On its moving part is a small mirror which reflects light from a 6 candle-power auto-type light bulb onto a 14-inch scale drawn on a horizontal curved plate.

A self-generating light sensitive cell connects directly with the meter. There also is a filter wheel in which four filters are set, three of them for color tests, the fourth for brightness reading only. A fifth position usually is used for opacity and gloss tests.

The light chamber consists of two sections, a front and a back, the front having an opening about 2½ inches in diameter against which the specimens are placed, the back section carrying three 21 candle-power auto-type light bulbs to illuminate the specimen under test. A tubular center passage allows the reflected light to reach the light sensitive cell, passing through the color filters on the way. The inside surfaces of the light chamber are smoked white with magnesia ribbon smoke.

Built into the instrument is a voltage regulating transformer, the primary of which is connected to a 110 volt, 60 cycle circuit through a conveniently located switch. The secondary voltage is approximately 6.3 volts, current at this voltage being supplied to the meter and to the three bulbs in the light chamber.

A timing device turns the current on and off periodically. The current is on for approximately 10 seconds to allow time to read the meter, and off for 10, 20, or 30 seconds, as selected, to allow time to change specimens and make records.

Materials of a solid or semi-solid nature, such as paper, pulp, wood, etc., may be tested with the instrument in the horizontal operating position; while pigments, granular materials, liquids, and the like may be tested in suitable containers with the instrument in the vertical operating position.

Complete color tests of a single specimen can be made in from 3 to 10 minutes, depending somewhat on the mechanical structure of the specimen.

To make tests for gloss, the specimen is set at an angle, using an adapter, and the readings are compared with other specimens or with a standard. Opacity measurements are made in similar manner.

Observation Port for Boiler Furnace

Detroit Stoker Company, Detroit, Michigan, has announced the development of an observation port for the inspection of fuel bed, furnace walls and boiler tubes of a steam boiler without admitting cold air to the furnace. The port, designated as the *Detroit Fire Observer,* makes use of a colored Pyrex glass plate as an observation opening. This port is 6 inches wide and

4½ inches high. It is covered on the inside with a shutter which is closed or opened through a handle on the outside of the device. When the shutter is in open position, a Monel metal screen protects the Pyrex glass plate, which, in turn, diffuses the glare and permits safe, clear vision of the furnace. The manufacturer recommends two or more fire observers for each furnace.

Centrifugal Pump Priming System

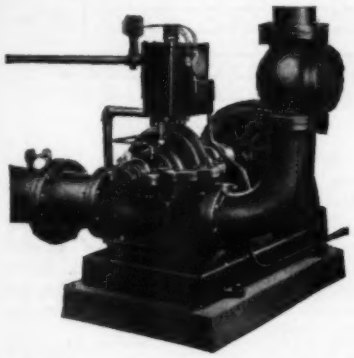
A centrifugal pump priming system, which automatically lifts the water level on the suction side of a pump above the eye of the impeller and holds it there continuously, whether the pump is running or not, has been developed by the De Laval Steam Turbine Company, Trenton, N. J. The application of this system, known as the *De Laval Submerged-Suction Priming System,* requires only the arrangement of each suction bell of the pump for the attachment of a pair of concentric pipes. These pipes, one of each pair known as the wet pipe, and the other, which is located inside the first, as the dry pipe, connect with a priming chamber mounted above and on the pump casing. The priming chamber, in turn, is connected to an air evacuating device, consisting ordinarily of a simple water, air or steam ejector drawing from the chamber through a check valve and discharging to waste at some convenient point.

When the ejector is started, air is withdrawn from the priming chamber, the pump casing and the suction line, causing the water to rise through the latter, filling the pump and eventually passing up through the wet pipe and rising in the priming chamber. The starting and stopping of the ejector is controlled by a valve operated by a solenoid energized from an electrical device which responds to the water level

within the priming chamber. This same device also controls the starting and stopping of the main pump motor.

The governing impulses originate from two electrodes which enter through the top wall of the priming chamber with insulating bushings, similar to spark plugs, and terminate at different levels in the priming chamber. The electrodes are connected to one terminal of the secondary circuit of a small a-c. transformer, the priming chamber itself being connected to the other terminal, while the circuits of which they form parts include a magnetic relay which is so arranged that the ejector will be started, and the pump motor prevented from operating whenever the water level falls below the lower electrode, while the vacuum producer will be shut down and the pump permitted to operate when the water reaches the upper electrode.

In most cases, once the system has been primed, the water level in the priming chamber never falls below the lower electrode so long as the pump continues in operation, since most of the air in-leakage is carried through the pump with the water. After the initial evacuation of the suction line, the eductor does not have to operate



unless the pump is shut down for a considerable period, and then only for a few seconds at a time whenever in-leaking air accumulates in the priming chamber.

Where the main pump, without danger, can be operated dry, the priming equipment may be arranged to prime the pump while running, requiring only a slight change in the electrical and sealing connections.

Hydraulic Actuator For Valves

Automatic Temperature Control Company, Inc., 34 East Logan Street, Philadelphia, Pa., Sales Representative, has announced the development of a hydraulic actuator for valves. The actuator, designated as the *Barnes multi-power hydraulic actuator,* is manufactured exclusively by W. F. and John Barnes Company, Rockford, Ill. It consists essentially of a motor driven gear pump, an oil reservoir (the pump housing serving as the reservoir), and a vertically positioned ram and two-piston arrangement, a large piston and a small one. The motor is coupled directly to the driving shaft of the gear pump, but there also is a hydraulic jack arrangement that permits manual operation of the pump in case of power failure. As the ram takes its upper stroke, the oil above it is forced into the oil reservoir. The large piston, used to exert sufficient power to break a gate from its seat under adverse conditions, travels only a fraction of an inch, but, in doing so, picks up the small piston to which the valve stem is coupled. When the large piston is lifted from its seat the oil from the pump acts directly on the small piston, which, after the gate is

loose, has sufficient power to lift the gate for the balance of the stroke. A limit switch cuts out the motor at a predetermined point of travel.

On the closing stroke only the small piston is used. An adjustable pressure cut out switch breaks the motor circuit when a predetermined pressure is reached in the chamber above the small piston. This arrangement permits a valve to be closed with just sufficient pressure to insure tight seating.

The range of capacity of the actuator is stated to be practically unlimited. It also is suggested for opening and closing operations on globe, gate, butterfly, and rotary plug valves as well as other similar applications. The actuator, likewise, is said to be easy to install on existing equipment and to be readily adapted to any make of gate valve by converting to slip stem construction and substituting a new yoke for clearance of the coupling between valve stem and ram rod.

Small Adjustable Speed Electric Drive

An all-electric, a-c., adjustable speed drive, consisting of a control unit and an adjustable speed motor which is applied directly to the machine to be driven, has been developed by The Reliance Electric & Engineering Company, 1078 Ivanhoe Road, Cleveland, Ohio. The speed control unit has been designed for use on three-phase, 60 cycle, 220, 440, and 550 a-c. circuits. It is of vertical construction, and requires no careful leveling in mounting. Three wires from the a-c. power source are connected to the control unit exactly as would be done with any motor and control. From the control unit, secondary circuits are run to the driving motor, to a speed adjuster, and to start and stop buttons.

The driving motor is a Reliance Type T, designed particularly for adjustable speed service. It can be supplied in a variety of types, including enclosed fan-cooled, splash-proof and explosion-proof. Gear-motors also may be used. Connection to the driven machine may be by any of the methods regularly used for direct-motor drives.

The motor can be started and stopped without interfering with the speed setting.

PAPER MILL MACHINE TENDERS

LIKE

Purves Wires*

BECAUSE

√ They allow them to maintain operating schedules.

√ They are made to give all around service.

√ They are as good as the best.

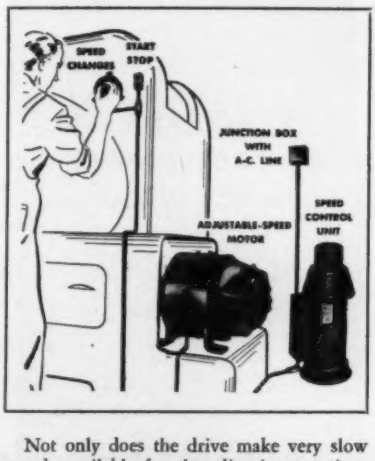
Purves Machine Wire Co. Inc.

HOLYOKE, MASS.

*Wires with a patented non-crack selvage.

Moreover, the speed can be changed while the motor is in operation. Quick stopping is obtained by regenerative braking. Furthermore, no clutches are needed since ample torque has been provided for all starting conditions.

When the work calls for operation of the motor in both forward and reverse directions, a small drum-type reversing switch is used instead of the push-button station.



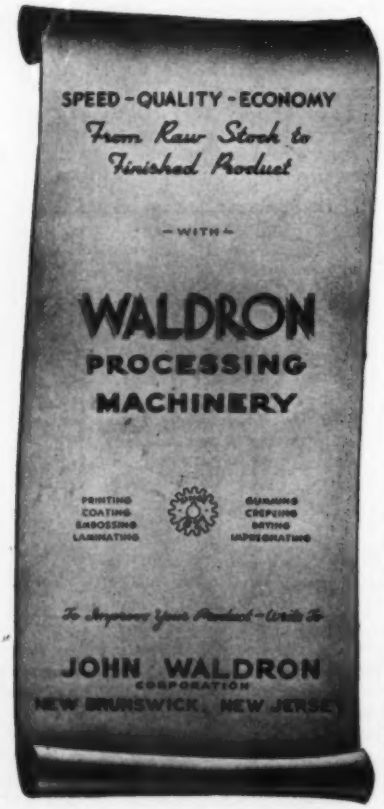
Not only does the drive make very slow speeds available for threading-in operations or for setting up work, but also, by simple manipulation of a knob on the face of the speed adjuster, an almost infinite number of speeds with an over-all speed range, which may be as great as 12 to 1, can be obtained.

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

Climatic Conditions and Printing

The effect of humidity and temperature of the air, on the paper, inks, and rollers is discussed. The optimum is ordinarily about 20 deg. C. with the relative humidity at 65 deg. If these conditions are changed to any great extent, there will be changes in dimension, dusting and static electricity in the paper. Furthermore the consistency of the ink and its rate of drying also change. Printing rollers become softer, and swollen in summer, and hard in winter. Roller-makers however try to anticipate this difficulty by supplying harder rollers for hot weather and softer ones for cold weather. The author points out such printing troubles as repelling of successive inks, smudging, ink drying on the rollers "strike through", static electricity, wrinkle formation, odors, peeling off of lacquers, non-adherence of inks, misregistering, fuzz formation, darkening of bronze inks, flying of ink, dusting of paper, sublimation of ink, poor drying, and the sticking together of printed sheets. Possible remedies are also suggested. Air conditioning equipment, notwithstanding its initial cost, serves to overcome these troubles, and is recommended. Anonymous. Papier-Ztg. 63, No. 91, 1862, 1866, and 1868, and No. 92, 1884-7 (1938); through Bull. Inst. Paper Chem. 9, 258 (1939).



Cooking Experiments on Philippine Woods

Twelve species of hardwood, the chemical compositions of which had been previously studied, were pulped by the sulphite process. The results are not very encouraging. Delignification proved difficult, and the general statement is made that because of the shortness of fiber, the woods cannot be considered good raw material for papermaking. The difficulty of digestion also eliminates most of them from commercial consideration in the manufacture of rayon pulp, despite the fact that some of the bleached pulps are actually of better quality than certain commercial rayon pulps, and that the yields of bleached pulp per m^3 are high.

Among the species studied, three gave comparatively good rayon pulp. They are guijo (*Shorea Guiso*, Bl.), almon (*Shorea eximia*, Scheff), and amungis (*Koordrsiodendron pinnatum* Merr.). All of them were hard to cook, and the time periods were about 12 hours. The composition of the cooking liquors was 4.28-4.41 per cent free SO_2, 1.17-1.2 per cent combined SO_2, and 1.02-1.05 per cent CaO. The respective yields were 48.6, 54.9 per cent, and 42.7 per cent unbleached pulp, and 42.8, 52.6, and 36.6 per cent bleached pulp, in which the respective alpha cellulose contents were 91.9, 89.7 and 93.05 per cent. The cooking conditions for all the woods are given in detailed tabulation, as are fiber dimensions of the pulps, and the chemical compositions, etc., of the bleached pulps (except in two cases, "kalantas" and "ipil" wood, which could not be delignified under the conditions of the experiment). Ihachiro Miura. Cellulose Ind. (Tokyo). 1938, pp. 453-8 (English abstract).

Studies in Calendering

A comprehensive report from the Techiical College at Darmstadt. Amelang and Weiler (collaborators of the author) prepared sheets from 7 different stocks, under standardized conditions of beating (70 deg. S.R.). The smoothness was tested before and after supercalendering (using an experimental machine which is fully described). Figure 1 shows the so-called "smoothing factor" which shows to what extent the smoothness of an uncalendered sheet has been multiplied, by supercalendering. The increases are relatively enormous. It will be noted that according to the Bekk test, smoothness of an esparto sheet was increased more than 170 times. Figure 2 shows the effect of various fillers in varying amounts on the percentage increase (or decrease) in smoothness after calendering of sulphite sheets (50 deg. S. R.), prepared by Pfretzschner. Here size and shape of particle effects the smoothness. Smoothness increases with increasing deg. S. R., both for calendered and uncalendered pulps. However the smoothing factor (referred to above) decreases with increasing degree of beating. In general it can be said that smoothness of a paper sheet increases with increased moisture content. A writing

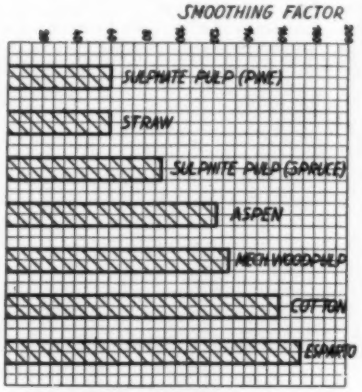


Figure 1

paper, a poster paper and a glassine paper were examined by various investigators. (Here mill supercalenders were used.)

The author discusses the techniques of moistening. The importance of extreme regularity of moistening is stressed. Moistening by use of air (while it is not yet commercial) has given the best results.

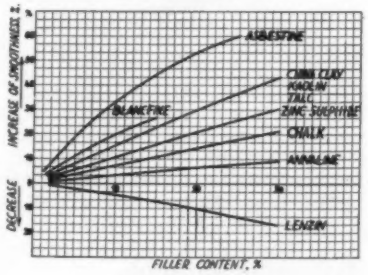


Figure 2

Storage prior to calendering has been studied. Figure 3. shows that the moisture content (at 18 deg. C and 55 per cent rel. humidity) may increase or decrease depending on the initial values. It remains almost constant at about 6.5 per cent for writing paper (120 g/m^2). The resulting changes in smoothness, with supercalendering after storage, are also shown in this figure.

Very evidently the influence of storage on resultant smoothness is due only to moisture changes. (When paper is stored at 95 per cent rel. humidity, there is no appreciable change in moisture content or in smoothness with time of storage, provided the initial water content is sufficiently high.) Storage of moistened paper however effects the better running of paper through a calender, since internal tensions in the sheet

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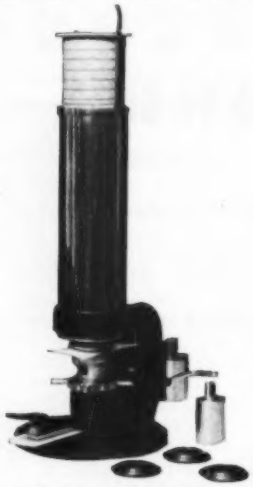

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have undergone a better distribution. The probable action of the calender is due to pressure and friction. However the part which each component plays is unknown. The author and his colleagues have devised an experimental super-calender, shown in Figure 4, and the methods of moistening (air-moistening), the influence of pressure, of working speed, and of roll temperature are fully discussed. Up to a certain pressure, the thickness and permeability of the sheet decreased markedly. At pressures higher than this (700 lb. per inch) no further changes were noted. Gloss values increase with pressure, so does transparency. Reflectance decreases. The strength values change very little with increased line pressure. However breaking length, stretch, anr folding endurance show a very gradual increase with pressure, while the tear strength shows a very slight decline. Smoothness naturally increases with pressure.

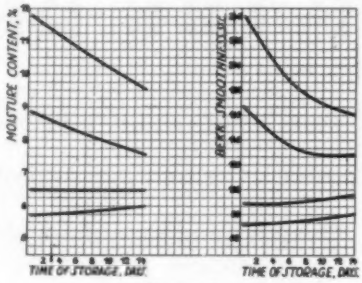


Figure 3

The effect of beating was also studied in the case of a number of handsheets beaten to varying degs. S. R. Where the working width of the sheet in the experimental calender was only about 1/6 of the usual width, the change in calendering effect corresponded to that manifested by 1.4 times the line pressure (i.e. not a sixfold increase). Only when the paper has such a thickness that it can no longer be pressed into the soft paper rolls, does the line pressure rise, with diminishing width of the paper web. Applying a constant pressure of 700 lbs./in., the author studied the influence of increases in working speed of his experimental supercalender. The greater the increase in speed, the greater was the rise in temperature of the rolls (20 deg. C at 103 ft./min.; 72 deg. C at 618 ft./min.). With increased speed, smoothness and gloss increase. Reflectance and transparency show little change with speed increase. The effect of drying seems to be slight. With increasing roll temperature (at constant speed and pressure), the *top-side* of the paper sheet shows a decrease in smoothness and gloss. However the wire side showed a definite increase of smoothness and gloss. Reflectance and transparency changed very little. The author gives 28 figures, mostly graphs. Despite a very thorough investigation, he considers these experiments as being only of orientating value. The Paper-Maker and Brit. Paper Trade J. 97. T. S., 41-52 (1939).

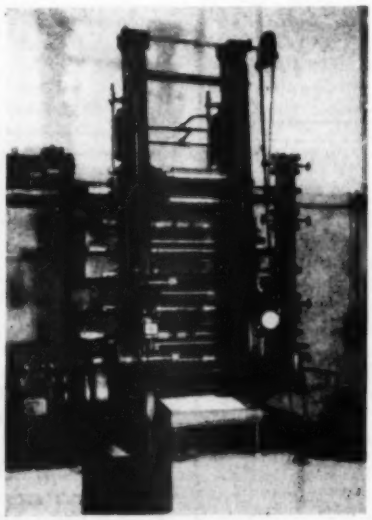


Figure 4

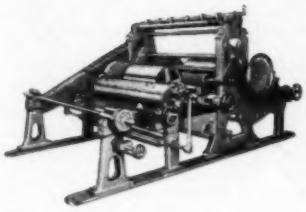
Pulp Pectins

The author (cf. *The Paper Industry*, Sept. 1937, p. 693) has shown that easily parchmentizable spruce sulphite pulp, when treated with 1 per cent HC1 for 30 hours at 20° deg. C., washed, and then extracted with 0.2 per cent NH_4OH for 3 hours at 20 deg. (what he terms) pectic acids are extracted. The extracts give a white, flocculent precipitate with HC1, or $CaCl_2$ solution, and the naptholresorcin reaction is positive. Quantitative determinations of CO_2 (by heating bleached sulphite pulps) with 12 per cent HCl indicate 2.06-2.50 per cent galacturonic acid (calculated). In pulps which do not lend themselves to ready parchmentization, the uronic acid content varied from 1.43 to 1.6. Very poor parchmentizability was shown by pulps containing 0.77-0.94 per cent uronic acids. Unbleached pulps contained about 2.9 per cent of the "uronic acids", while the original wood or mechanical pulp showed 3.2—3.5 per cent. However in the last named cases, the lignin content interferes with parchmentization.

The author does not ascribe the CO_2 to "oxycellulose" formation. Furthermore, pulps that are not readily parchmentized, when treated successively with pectic acid and $Ca(OH)_2$ solutions may be rendered "fat-tight" much more easily. Sulphite pulps on beating to parchmentization in a Rieth-hollander are affected by pH. The beating time required is much longer in acid than alkaline solution. Omission of alum, expedites parchmentization. If easily parchmentizable pulps are previously extracted with ether-alcohol or benzol, washed, and then beaten, the parchmentising effect is completely lost. This is ascribed to retention of organic solvents, which then interfere with the necessary penetration of water. The influence of wood quality on the resultant parchmentization of the pulp has been studied in only a few cases, from which no generalization can be drawn. Otto Wurz and Otto Swoboda. Papierfabr. 37, Tech. Wiss. Tl. 125-7 (1939).

◆

▶▶▶ *George C. Andrew,* Boston sales representative of the Monadnock Paper Mills, Bennington, New Hampshire, is now near recovery from an operation undergone two months ago.



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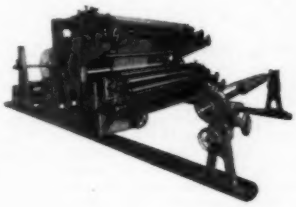

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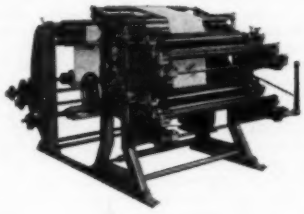

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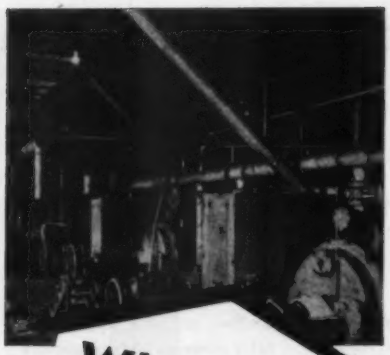

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New Catalogues and Publications

Acme Steel Co., Chicago, Ill.—An interestingly written and well illustrated booklet recently published by this company explains how practically every commodity can be braced for carload shipment by use of the company's "Unit-Load" band. The 24-page book explains how concerns in almost every industry have used the product for shipping. Of particular interest are the pages devoted to the shipping of paper. This publication, in addition to its clear explanation of the system of carload bracing, also illustrates the equipment used for application of the system.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—A new leaflet (No. 2351) published by this company, lists the generators built by the firm for all manner of ratings from 31 Kv.a. to 65,000 Kv.a. The release is illustrated throughout with many installation views and lists the type of generator, its K.v.a. or r.p.m. together with the name of the customer to whom it was sold and the year sold.

American Brass Co., Waterbury, Conn.—Seventy-five up-to-date pictures showing this company's product, seamless flexible metal tubing, are contained in a new brochure recently issued by the firm. The brochure, 24 pages in length, contains discussions on the proper use of the product for conveying steam, liquids, gases; controlling vibration, connecting misaligned and moving parts. There are also complete engineering data and specifications with simple installation rules.

Crosby Steam Gage and Valve Co., New York, N. Y.—A new bulletin describing the new pressure recorders manufactured by this company has been issued lately. Photographs and well-written material point out the construction and operative features of the recorders. There are dimensional drawings and specification tables included.

J. H. Day Co., Cincinnati, Ohio—This company has published a new bulletin (No. 375) on its "Ro-Ball" stabilized gyrating screens. The literature shows new applications of this equipment by means of several photographic illustrations. Specifications are also given.

Haynes Stellite Co., Kokomo, Ind.—An attractive booklet just published by this firm presents the physical, mechanical and chemical properties of the principal alloy products of the company, together with a brief description of each product.

Jeffrey Manufacturing Co., Columbus, Ohio—A new general catalogue (No. 87) containing almost 1,000 pages devoted to descriptions, illustrations and specifications of the varied Jeffrey line, has been issued lately by this company. The catalogue, case-bound in blue and de luxe in make-up throughout, is comprehensive in scope and gives detailed information on the construction and operation of all Jeffrey products. Included in the edition are detailed and well-illustrated sections on bins, canning equipment, chains, attachments, sprockets, coal mine equipment, conveying machinery, coolers and dryers, crushers, elevating machinery, feeders, foundry equipment, grinding balls and liners, hoists and winches, packers, portable loaders and unloaders, pulp and paper mill equipment, pulverizers, sand and gravel plant equipment, saw and lumber mill equipment, sewage disposal and water works equipment, screens, shredders, stackers, track hoppers, tranmission machinery and weigh larries. There are several very interest-

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ing pages devoted to log handling equipment and pulpwood handling equipment and in addition, there are many pages of useful engineering information included.

Lovejoy Flexible Coupling Co., Chicago, Ill.—This company has recently published a new catalogue which explains the construction and application of L-R flexible couplings. The catalogue is more complete in scope than previous issues and contains many photographs and much dimensional data as well as blue print drawings of the different types of couplings.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.—A new 48-page, plastic-bound, booklet covering the seven principal types of steam turbines in sizes up to 10,000 kilowatts has been published recently by this firm. The book contains comprehensive information on the application and selection of steam turbines. Large pictorial illustrations, cross-sectional views show typical installations and, in addition, all structural details — cylinders, rotors, blades, nozzles, bearings, seals, glands, throttle valves, steam chests, extraction valves and exhaust pressure regulators —are discussed in detail and illustrated by means of diagrams and cut-away views. Four-color charts show the operation of the lubrication system, governor and other control equipment. The catalogue (B 2198) may be obtained from the company, department 7-N-20.

BOOKS

Business Information and Its Sources (A Supplement)—Compiled by Marion C. Manley, Business Branch Librarian of the Newark Public Library, Newark, New Jersey, under the direction of Librarian Beatrice Winser, this publication of 37 pages rounds out a set of five pamphlets known as the "Business Information Library." The supplement, divided into nine chapters, treats of the following subjects: the approach to general information problems; finding information on special subjects; getting a broad background of business reading; business magazines, basic tools for current information; directories and their varied uses; trade associations as agents in securing information; the government as an information agency; the information uses of maps; and business research and the university. The supplement to "Business Information and its Sources" is priced at $1.00 a copy by the Newark Business Branch Library, Newark, N. J., through which it is obtainable.

Standards of Heat Exchange Institute (Condenser Section) — Heat Exchange Institute, 90 West Street, New York, N. Y., has published a second edition of its *Standards* covering the Condenser Section. The work is divided into two parts. Part One treats of Surface Condenser Standards; Part Two, of Barometric and Low Level Jet Condenser Standards. These standards contain material on nomenclature, definitions, condenser performance, materials of construction, atmospheric relief valve sizes, air pump capacity, tubing characteristics, air-water vapor mixture data, pressure-temperature conversion tables, and logarithms to base *e*. The price of the publication is $1.00 per copy, and copies may be obtained through the office of the Heat Exchange Institute.

Phillips Paper Trade Directory of the World—The 1939 edition of this widely used directory has been released by its publisher, S. C. Phillips & Co., 47, Cannon St., London, E. C. 4, England. Bound in its characteristic orange colored cloth cover, the volume is a work of approximately 900 pages. According to the publisher, this edition of the directory is the first directory to record the changes in the paper trade brought about by the recent remapping of Europe. The book is priced at twenty-one shillings a copy, postage extra.

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Bulk (mine) ton	11.00 to 20.00
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Bulk (lump) ton	13.00 to 24.00
Chlorine—	
Tank cars (wks) cwt.	1.75 to 1.90
Gelatine (silicin) lb.	.38 to .44
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E, per bbl.	5.40
F, per bbl.	5.65
G, per bbl.	6.15
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Rosin (Wood), per bbl., carlots	4.00 to 6.05
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Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
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Starch—	
Pearl, 140 lb. bags, cwt.	2.60 -
Pearl, barrels, cwt.	2.85 -
Paper (Sp.) bags, cwt.	2.70 -
barrels, cwt.	2.95 -
Sulphur (crude)—	
(mine) bulk, ton	16.00 to 19.00
Talc—	
Dom. 100 lb. bags (mine) ton	14.00 to 18.00
Imp. bulk, ton	20.00 to 40.00
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05½ to .06½
Calcium Pig., bbls., lb.	.05½ to .06½
Zinc Sulphide, bbls., lb.	.07½ to .08½

CHEMICAL PULP
(Air-dry ton)

	per cwt.
Soda (Dom.) del'd. mill—	
Bleached	2.55 -
Sulphate (Dom.) f. o. b. mill—	
Bleached	2.25 to 2.50
Kraft No. 1	1.75 to 2.00
Kraft, Southern, del.	1.40 to 1.65
Sulphate (Imp.) on dock—	
Bleached	2.25 to 2.50
Kraft No. 1	1.30 to 1.50
Kraft No. 2	1.20 to 1.30
Sulphite (Dom. & For.) On dock—	
Prime bleached	2.25 to 2.50
Prime easy bleach	1.90 to 2.10
Prime strong unbl.	1.70 to 2.00

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. mill)	19.00 to 22.00
No. 1 Imp. (On dock)—	
Moist	23.00 to 24.00
Dry	21.50 to 23.00

PAPER
f. o. b. New York City

	per ton
Boards—	
Binders	71.00 to 77.00
Chip	27.50 -
Chip, sgl. mla. lined	40.00 to 42.50
Coated, white patent	
.016	60.00 -
.020 and heavier	55.00 -
Kraft liner	45.00 to 47.50
News	27.50 -

	per cwt.
Book (coated)—	
No. 1 Glossy Coat	9.90 to 12.50
No. 2 Glossy Coat	8.50 to 10.75
No. 3 Glossy Coat	7.50 to 9.50
No. 4 Glossy Coat	7.00 to 9.00
No. 2 Offset	6.45 to 8.25
A Grade M. F.	6.25 to 8.00
A Grade Super	6.50 to 8.25
B Grade M. F.	5.75 to 7.50
B Grade Super	6.00 to 7.75
C Grade M. F.	5.50 to 7.25
C Grade Super	5.75 to 7.50
D Grade M. F.	5.25 to 7.00
Ivory & India	.50 cwt. extra

	per cwt.
Bonds (Rag Content)—	
100% Rag	
Ext. No. 1	39.10 to 46.00
100% Rag	31.05 to 36.50
85% Rag	
75% Rag	23.60 to 27.75
65% Rag	20.50 to 25.00
50% Rag	17.55 to 21.50
25% Rag	14.65 to 17.75
Regular Colors	1.00 cwt. extra

	per cwt.
Bonds (Sulphite)—	
No. 1	8.60 to 10.50
No. 2	7.70 to 9.50
No. 3	6.85 to 8.25
No. 4	7.00 to 8.50
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	12.25 -
Bleached (25 lb. up)	11.25 -
Unbleach (25 lb. up)	9.50 -
Greaseproof—	
Bleach. (25 lb. up)	9.25 -
Unbleach. (25 lb. up)	8.75 -
Ledgers (Rag Content)—	
100% Rag	per cwt.
Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.90 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.65 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra

	per cwt.
Ledgers (Sulphite)—	
No. 1	9.75 to 12.00
No. 2	8.90 to 10.75
No. 3	8.00 to 9.75
No. 4	8.20 to 10.00

	per ton
News—	
Rolls (Contract)	50.00 -
Rolls (Spot)	(nominal)
Sheets	58.00 -

	per ream
Tissues (Carlots)—	
White, No. 1	.82½ -
White, No. 2	.60 -
Anti-Tarnish M. G.	.67½
Colored	.77½ -
Kraft	.65 -
Manila	.60 -
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.41 -
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.43½ -
Toilet, Bleached (M shts.) per cs.	5.80 -
Toilet, Unbleached (M shts.) per cs.	3.25 -

	per case
Towels—	
Bleached	3.10 to 3.65
Unbleached	1.95 to 3.30

	per cwt.
Wrappings (Kraft)—	
Extra Quality	4.75 to 5.25
Super-Standard	4.12½ to 4.62½
Northern Standard	4.00 -
Southern Standard	3.50 -
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	per cwt. 5.75 -
(10,000 lbs.)	6.00 -
Drug wrapp. 35 lb.	6.00 -
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	4.25 -
No. 1 Butchers	4.50 -
No. 1 Imit. Parch & Dry Fin. Groe. Sulphite 30 lb.	4.875 -
No. 2 Imit. Parch & Dry Fin. Groe. Sulphite 30 lb.	4.625 -
Steam Finish, 50 lb.	3.625 -
Water Finish, 40 lb.	4.25 -
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	4.75 -
Envp. Mla., Sub. 16-28 (No. 2)	4.50-
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.00 -
No. 2	4.75 -
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-25 lb.	5.25 -
Grade B-25 lb.	4.75 -